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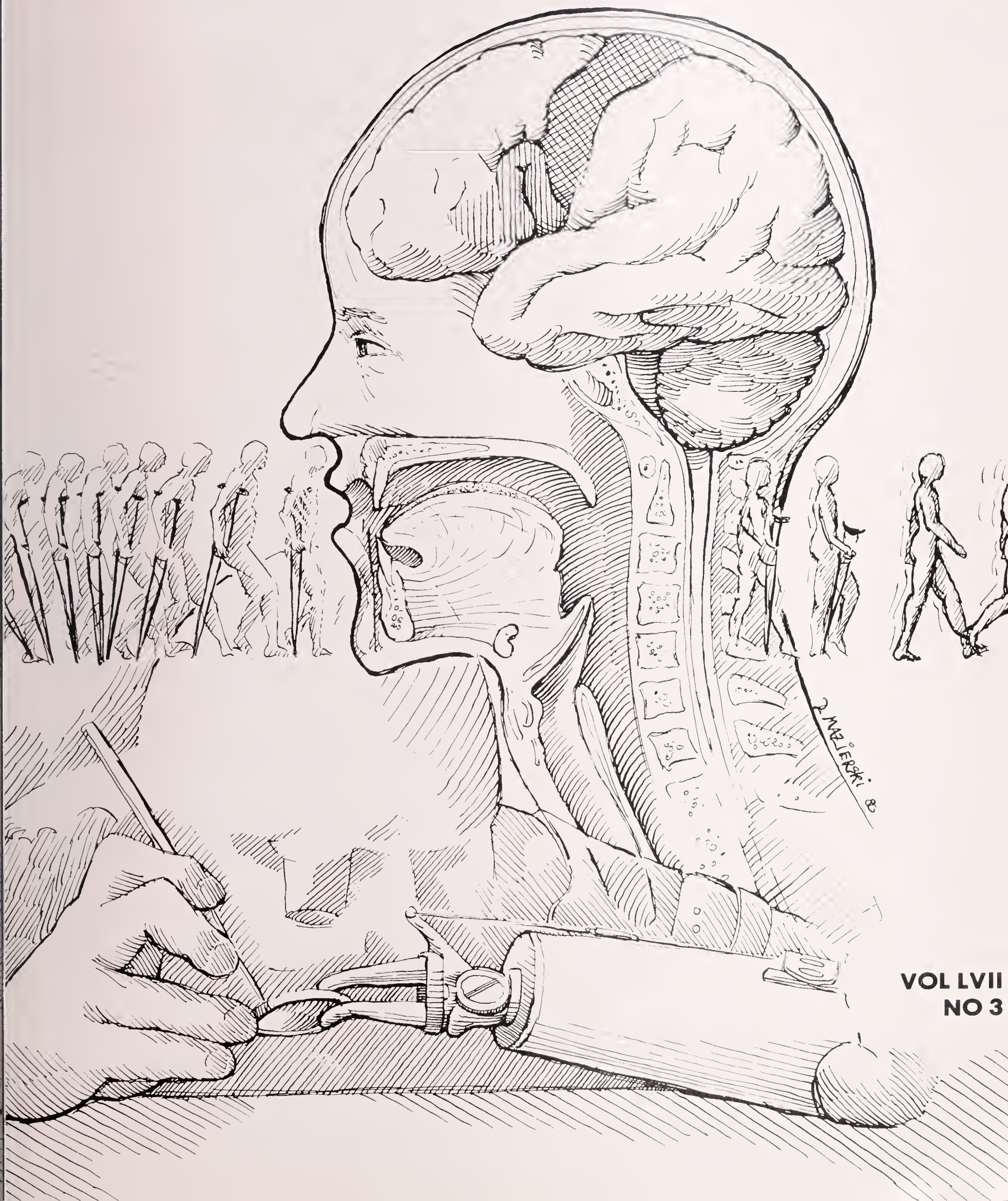

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GUIDELINES FOR PUBLICATION

1) All articles intended for publication should be submitted to the editors before the deadline which is usually six weeks before the release of the Journal
2) Submitted articles should be typed (or legibly printed) double-spaced, single-sided on paper 8½" x 11" (letter size) and they should not be more than 15 to 20 pages (3000 to 4000 words)
3) Illustrations, graphs, diagrams and figures should be put on a separate sheet and identified by Arabic numerals A list of explanatory legends for all the figures and diagrams should be put on another sheet Do not write on the back of photographs
4) References should be checked with the original sources, designated by Arabic numerals in the text, numbered in order of appearance and put on a separate sheet Each periodical reference should include in order the author's name and initials, title of the article, Journal name, volume number, page number and year (eg , 1 Rosen HJ· Lumbar invertebral disc surgery review of 300 cases *Can Med Assoc J , 101 317, 1969*)
5) The editors reserve the right to make such editorial changes as are deemed necessary to ensure correctness of grammar and spelling, clarification of statements and conformity to Journal style
6) Acceptance for publication is subject to the understanding that such material is submitted solely to the Journal and will not be reprinted without the consent of both the editors and author

Physical Therapy: A Developing Profession

Julie Freeman, Dora Novak, Kathy Kachur, Art Fraser
P.T. Year IV

Rehabilitation medicine involves the assessment, treatment and training of a patient so that he may attain his maximal potential physically, psychologically, socially and vocationally. Physiotherapists are specialists in rehabilitation who treat patients with an array of physical disabilities resulting from a wide variety of causes: pain, disease, aging, trauma, enforced inactivity, congenital abnormalities, psychological and social stress.

Physical therapy is a professional program offered by the Department of Rehabilitation Medicine at the University of Toronto, under the auspices of the Faculty of Medicine. The curriculum consists of a minimum of four academic years following Ontario grade thirteen. At least one year is required in the Faculty of Arts and Science, followed by three years of intensive training in the academic and clinical setting. Compulsory courses include anatomy, kinesiology, physiology, medicine and surgery and exercise physiology. Specialized physical therapy courses involve training in assessment, treatment and management of musculoskeletal, neurological, cardiorespiratory, rheumatoid and other specific conditions (burns, sports medicine, obstetrics and gynaecology). In hospitals and treatment centres, students are required to spend approximately one thousand hours working under the supervision of a qualified therapist in the actual treatment of patient conditions.

Some Areas of Involvement

In the hospital setting, therapists are involved in several major areas. Musculoskeletal disorders are dealt with on both an in-and-out-patient basis. Management aims at relief of pain, increasing range of motion and improvement of strength, thereby achieving maximal functional potential. Treatment techniques available to the physical therapist include mobilizations, exercise programs, education, and modalities such as biofeedback, transcutaneous nerve stimulation, ultrasound and electrical stimulation.

Physiotherapists are also actively involved in the treatment of patients with cardiorespiratory conditions within the hospital and home setting. Treatment programs emphasize self-care and generalized fitness. When dealing specifically with chronic chest conditions (bronchitis, emphysema and asthma) and post-surgical conditions, the physiotherapist integrates the knowledge of the anatomy and physiology of the chest wall and lungs in order to provide appropriate treatment. Techniques such as deep breathing, suctioning, clapping and various facilitatory stimuli are used to improve ventilation and ultimately, cardiorespiratory function.

Physiotherapists also play a role in the multidisciplinary approach to the rehabilitation of neurological patients. He/she works closely-with medical personnel, occupational and speech therapists and social services to develop appropriate goals and management for each patient. Specifically, the physical therapist's task is to change the abnormal patterns of posture and movement so the patient may attain some level of independance in their activities of daily living. The physical therapist participates with other team members in long term plans and discharge planning for most patients with neurological disorders.

Conclusion

Under the present system, before treatment can commence a written referral is required from a qualified medical practitioner. This referral system is at present being re-evaluated so that in the future the accessibility to our services may be broadened to include not only the traditional referral system but also a primary contact system.

Although traditionally, in the past, physical therapy has been involved in rehabilitation of the disabled, it is hoped that in the future this profession will increasingly contribute to the field of preventive health care. □

Occupational Therapy– A Perspective

Laura Babiski O.T. Year IV

This article presents an overview of the profession of occupational therapy. The historical and philosophical foundations of the profession will be discussed as well as educational requirements and qualifications for employment.

Occupational therapy is a relatively new health care service, existing formally as a profession in the U.S.A. since 1917 and in Canada since 1920. The profession is expanding globally: the World Federation of Occupational Therapy had an original membership of 10 countries in 1952, and currently has a membership of 32 countries.

Most hospitals and clinics in Canada require that therapists are registered members of the Canadian Association of Occupational Therapists (CAOT); that is, they must have graduated from a university level O.T. program which has been accredited by the CAOT.

Education

Students of occupational therapy study a wide variety of subjects including the medical sciences (anatomy, neurology, pathology), the social sciences (sociology, interpersonal relations, arts and sciences electives), the biological sciences (human physiology, kinesiology), and the behavioural sciences (psychiatry, psychosociology). These studies, along with clinical experience, combine to create the learning environment for the O.T. student, who graduates after four years with a Bachelor of Science in Occupational Therapy.

Areas of Employment

An O.T. is most frequently seen working in any of a variety of hospital settings as a member of a rehabilitation team. With increasing health costs and the trend toward preventative medicine and home management, more and more therapists are working in the community. Therapists in the community practise in private homes, or as consultants to nursing homes, industries, schools, government services (March of Dimes, etc.) and vocational rehabilitation centres.

Philosophy

The O.T. stresses functional independence for patients in all aspects of daily living. Treatment does not deal solely with symptomatology, but deals with the effects of symptomatology on a person's entire lifestyle. The treatment goal is to restore a maximal functional capacity in all areas of the patient's life. The O.T. assesses the physical, psychological and social functioning level of a patient, and determines to what extent his particular disability disrupts his functioning in these areas. Therefore, treatment is aimed at either the restoration of function in the area affected and/or adaptation in his environment in order to facilitate a satisfying and effective interaction.

Treatment Focus

Numerous activities of daily living are addressed by the O.T. Often simple skills that are taken for granted are of key importance. An inability to perform such simple tasks as dressing, feeding and grooming can foster the development of frustration and dependence. These tasks must be addressed, for example, in the stroke patient with his suddenly acquired perceptual and motor deficits.

The O.T. is also involved in the assessment of skills that the patient has maintained, and helps him to employ these skills for maximum independence in all facets of his life — personal, vocational and social. By determining the potential problems that a person may encounter in these areas, the O.T. aims to build the skills necessary and/or help to define the necessary adjustments in the working and living environment in order to achieve an effective interaction in these areas.

The O.T. is important in the education of the patient, his family and the public as to problems associated with specific disabilities. Thus, they may be better equipped to deal with the psychological and social complications often associated with specific handicaps.

In this way, the O.T. can be viewed as a liason health care professional who focuses on the

transition from the hospital to the community. For example, in a psychiatric setting, a neurotic patient may have difficulty setting daily priorities and, therefore, may never satisfy his needs. The O.T. could help the patient set priorities, and help him to schedule his time to include his physical (relaxation techniques), psychological (self-awareness groups), and social needs (assertiveness training), thereby providing some sort of structure with which to deal with the world after living in the very protected and structured environment of the psychiatric ward.

Treatment Modality

The O.T. uses functional, purposeful activities in order to fulfil many of the living skill goals of her patients. The choice of activity is not based on the diversional or enjoyment assets it possesses, although these characteristics are often helpful. These qualities promote a spontaneous motivation to work at specific limitations in a satisfying, productive and enjoyable way.

The choice of an activity is based on its therapeutic value, and for the purposes of the O.T., these are:

1) goal-directed,
2) relate to the role that the patient plays in society,
3) require physical or mental involvement,
4) achieve prevention of malfunction, maintenance or improvement of function,
5) provide for the development of competence in the performance of those tasks essential to life roles,
6) relate to the interests of the individual,
7) are adaptable to the patient's progress or regression,
8) focus on the patient's physical, psychological or social functioning.

Physiotherapy and Occupational Therapy

The roles of the physical therapist and the occupational therapist often overlap. Whereas the P.T. focuses primarily on the physical functioning of a patient, the O.T. addresses the psychological and social functioning as well. This holistic, functional approach to the patient and the therapeutic use of activities distinguishes the two professions. In order to provide maximal rehabilitation, the P.T. and O.T. should work closely together.

Conclusion

In conclusion, the O.T. works from three bases: the medical base, the holistic base in the approach to treatment, and the activity process base as a means of developing skills. Upon these bases, the O.T. has developed specific treatment techniques and plays an important role in the rehabilitation of certain patient populations. □

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Speech/Language Pathology

Lorraine Murray Year II M.H.Sc.

"Doctor, Johnny doesn't seem to talk as much as my neighbour's little boy who is the same age. Is he normal?"

Johnny is three years old and is in the doctor's office for his annual checkup. he is expressing himself in single words. **Is** *he normal?*

The family physician is in the front line in the early detection of communication disorders. Children whose language is failing to develop, or is developing abnormally must be identified as early as possible to maximize the results of intervention by the speech/language pathologist and the educational system.

The speech/language pathologist? What does she do? As an allied health professional, the speech pathologist is an integral part of the total health care team available to the individual seeking medical assistance.

The speech language pathologist typically holds a Master's degree, or the equivalent (an L.C.S.T. (Britain), or a D.S.P.A. (Ontario, prior to 1980), although several Canadian universities offer undergraduate degrees in speech pathology. Training takes place over a two or three year period, depending on the university: the University of Toronto offers a two year program. 1980 marks the first year that a class will graduate with a Master's Degree in Health Science in Speech Pathology. Prior to this, graduates were awarded a Diploma in Speech Pathology and Audiology (D.S.P.S.).

At the University of Toronto, the first year student is given a foundation in anatomy and physiology, linguistics, psychiatry, as well as courses in the various types of speech and language disorders. During the summer between the two years, each student completes a twelve week hospital internship. Second year combines academic studies in diagnostic procedures, audiology, aural rehabilitation, clinical administration and various special topics with clinical placements throughout the city. Through these the student gains more direct experience with clients having various speech and language disorders.

So, there is a speech/language pathologist down the hall in the department of Rehabilitation Medicine, or in the Otolaryngology department, or in the office next to the hospital audiologist. Who should be referred to her/him? What is the scope of the speech/language pathologist's expertise?

Development of Speech

To return to 'Johnny' of the introduction, a child who is speaking in single words at three years of age is clearly functioning at a level below the norm for his chronological age. In this case, referral to a speech/language pathologist for a full assessment of communication is essential. As stated earlier, the early detection of communication disorders in children is critical if the child is to reach his potential in language development.

A second child who may appear in the family physician's office is the one whose speech is impaired by multiple articulation errors. This is the child who says 'w' for 'r', 'f' for 'th', 'th' for 's', 't' for 'ch', 's' for 'sh', and so on. Of course, some of these errors are normal in the young child whose speech is just developing, but the physician who has an understanding of normal patterns of speech development will be able to assess children he/she sees and decide whether they should be referred to a speech pathologist for closer investigation.

Cleft Palate

The child with a cleft palate or another maxillo-facial anomaly is another candidate for the services of a speech/language pathologist. Even after repair of the cleft, the child is more often than not left with an inadequately functioning soft palate, resulting in nasal air emission, hypernasality of speech, and distorted articulation. Diagnostic speech therapy may clarify whether this velopharyngeal incompetence may be functional or physiological in nature. If the incompetence is functional, therapy may bring speech close to or within normal limits; if it is physiological, further surgery, such as a pharyngeal flap, may be recommended, with subsequent speech therapy helping the child to make maximal use of his new anatomy in approximating normal speech.

Stuttering

One of the more obvious situations in which a speech/language pathologist is involved is that of a child or adult who stutters. Stuttering is a disorder of rate and timing in which the normal fluency of speech is disrupted by multiple sound and word repetitions, numerous interjections, abnormal sound prolongations, and hard blocks during which great effort is unsuccessful in 'forcing words out.'

A certain amount of dysfluency is normal in everyone, and in children of 3 and 4 years of age, a stage of considerable stuttering is frequently encountered. However, if a child of this age stutters a great deal, or if he seems to be aware of and disturbed by his dysfluent speech, referral to a speech/language pathologist is appropriate. Even if the child is unaware of his dysfluency, but his parents are upset by it, a speech assessment should be recommended. Of course, adults with dysfluent speech may also be referred to a speech clinic for assessment and therapy.

Rehabilitation Medicine

Another major area in which the speech/language pathologist works is that of Rehabilitation Medicine. The speech and language of the victim of a cerebrovascular accident is often affected by damage to the controlling centres, the patient being dysphasic or aphasic according to the amount of damage. He should be seen by a speech/language pathologist very soon after onset, so that the nature and degree of impairment may be determined, and therapy, if required, may commence as soon as the patient is stable enough to cope.

Victims of cerebral trauma may also suffer all degrees of therapy requiring speech and language impairment, as will victims of many other neurological disorders, ranging from Parkinsonism to bulbar palsy to multiple sclerosis.

Voice Production

The speech/language pathologist is also trained to work with patients who present with various types of disorders involved in voice production. In this area, the therapist must work closely with the otolaryngologist to ensure that the patient is receiving integrated and maximally beneficial treatment. Not infrequently, a period of trial voice therapy is undertaken prior to a surgical procedure, and in some cases, therapy aleviates the need for surgery. Such problems as vocal nodules, contact ulcers of the vocal folds, and vocal polyps may be resolved through voice therapy and the learning of new vocal use patterns which do not abuse the laryngeal structures.

The speech/language pathologist may even be involved in teaching a completely new type of voice production, as, in the case of the individual who has undergone a laryngectomy. Such an individual should be seen by a therapist prior to surgery, for discussion of post-surgical therapy, and then immediately after surgery, so that the process of learning esophageal speech may begin.

Hearing Impairment

One of the greatest challenges to the speech/language pathologist is presented by the child or adult with congenital or acquired hearing impairment. For the congenitally hearing-impaired child, the learning of speech and language is a monstrously difficult task. We learn language by hearing others speak. The child who is deprived of the easy use of the auditory channel needs much special training if he is to develop speech and language. The individual with the acquired hearing impairment faces the loss of speech precision, since he has lost the auditory feedback which allows self-monitoring and self-correction. Therapy can assist him in the maintenance of speech which is as close to normal as possible.

Conclusion

It should be clear that the speech/language pathologist is involved very closely in the total provision of health care services. Speech and language are among the most incredible and complex of all of man's abilities, and each individual deserves the assistance he needs to maximize his use of these skills. If the physician, is aware of the scope of speech/language pathology services, he/she will be better able to assist patients in achieving their communication potential.

The Canadian Speech and Hearing Association is the professional association in Canada to which speech/language pathologists belong. The provincial member group is the Ontario Speech and Hearing Association, Suite 504, 170 St. George St., Toronto, M5R 2M8. This organization has literature available on many aspects of speech, language and hearing, some of which is specifically designed for use by physicians in their practices. □

Torture As State Policy: The Medical Community Fights Back

Bob Jin 8T2

As an instrument of political repression, the systematic use of torture as state policy has been recognized in many countries today. The incidence and methods of the physical or psychiatric abuse of prisoners have been documented by human rights groups. Physicians and other medical personnel, such as those of the 23 Medical Groups of Amnesty International, play a key role in work against torture. Medical examination of victims, following defined protocols, help substantiate allegations of torture, and for some victims, facilitate their admission as refugees to nations such as Canada. Scientific research into the sequelae of torture, supplementing the continuing documentation of cases, will hopefully lead to acceptance of a diagnostic "torture syndrome." International codes of medical ethics regarding torture have been established. Through publicity campaigns, the world medical community is being alerted to physicians who actively take part in the torture process, and those who face persecution for their refusal to participate.

Consider the case of Hugo Pereyra, a 54-year-old trade unionist detained in 1977 by Uruguayan security forces in a Montevideo military barracks. His body, when delivered to his family, featured an assortment of head and abdominal injuries. The "official" cause of death: "cerebral embolism."

In September, 1977, Ukrainian dissident Iosif Terelya was committed to Dnepropetrovsk Special Psychiatric Hospital. His wife, a physician, has contended that he is sane. Mr. Terelya's health has now seriously deteriorated as a result of mandatory "treatments" with potent neuroleptic drugs.

Alberto Falicoff and his wife, Estela Cornalea, were two Argentinian doctors secretly arrested by the Army Intelligence Service in 1976. While Estela was kept bound and hooded, her husband was repeatedly subjected to electric shocks. "Once, while I was hearing the screams of Alberto," she later testified, "the loudspeakers called for a doctor. Then I heard the doctor say, 'That is all, if you still want him alive'..." Estela de Falicoff was released, but Alberto Falicoff remains one of an estimated 150 medical personnel who have "disappeared" in Argentina since the 1976 military coup.

An 'Epidemic' of Torture

Such are three examples of torture, a "man-inflicted disease" that "rages with epidemic frequency in our world," says Amnesty International, the London-based human rights organization which launched a worldwide Campaign for the Abolition of Torture in 1973. As practised in police stations, detention centers, concentration camps or hospital wards, torture is frequently an identifiable instrument of government policy. Its systematic use has been alleged in over 60 countries, of various political systems, in the past decade.

Virtually the world over, torture is understood to be forbidden. Article 5 of the *Universal Declaration of Human Rights*, adopted by the United Nations in 1948, reads, "No one shall be subjected to torture, or to cruel, inhuman or degrading treatment or punishment." In 1975, the U.N. strengthened its unconditional prohibition with the *Declaration on the Protection of All Persons from Torture*, etc. Most nations have constitutions or laws specifically proscribing the maltreatment of prisoners. Such safeguards, however, may be ignored during a proclaimed "state of siege" or "emergency rule," or when a government routinely denies the existence of torture.

Occasionally, torture may be justified as a "necessary evil" to deal with political extremists or lawless elements whose acts of terrorism may endanger lives or threaten national security. Such an argument, however, undermines the moral authority on which a government of a civilized society seeks to base its legitimacy. Moreover, historical evidence has shown that the use of torture, once sanctioned, has a tendency to propagate unchecked, becoming an expedient and efficient method of suppressing any political opposition, real or suspected. Writes Dr. Herman van Geuns, a medical ethicist for Amnesty International, "Torture can be regarded as a social cancer, both rapid and malignant in growth, and it can be treated only by total eradication."

Attempting to adequately define torture is difficult. In its 1975 Report On Torture, Amnesty asserted that:

Torture is the systematic and deliberate infliction of acute pain in any form by one person on another, or on a third person, in order to accomplish the purpose of the former against the will of the latter.

Several basic criteria were suggested:
1) The act involves at least two persons; i.e., a victim under the physical control of the torturer;
2) There is infliction of acute pain and suffering;
3) The torturer seeks to break the will of the victim (or a third party), and strip him of his human dignity;
4) Torture is a systematic activity with a rational purpose. This "rational purpose" may be to extract information or a confession, to intimidate the victim—thereby acting as a behavioural deterrent—or simply as "just" punishment.

A similar definition, mentioning "severe pain or suffering, physical or mental," was pronounced by the U.N. Commission on Human Rights in 1979. However, this definition has been considered inadequate, because it excludes the adverse effects on personality torture might also inflict. The use of psychotropic drugs, for example, to incapacitate an individual's will, may cause little "pain or suffering" per se.

The Torture Process

The widespread use of torture today is "essentially a state activity." Criminals or terrorists usually do not have available facilities for detaining many victims and administering sophisticated methods of torture. With its greater resources, and the authority invested in a government, the State is better able to organize an effective torture apparatus. One example would be the nation-wide network of interrogation centres covertly established in Brazil during the 1960's by the armed forces and the "Department for Public Safety." The most notorious program, *Operacao Bandeirantes*, was once called an "advanced school of torture." Training personnel attended lectures and demonstrations (using political prisoners) illustrating the latest techniques, while Brazilian officers conducted similar "courses" in military academies of neighbouring countries.

As members of elite police or military units that are immune to normal legal recourse, the torturers themselves are the ultimate examples of a subservience to authority and a "militaristic socialization." They are "hierarchial people (who) obey orders without question": shrewd, unbalanced, vindictive, and fanatically self-righteous. As a form of self-defence, torturers often enshroud their activities in elaborate rituals, creating a whole "subculture" of torture. Euphemisms and parodies abound. Hence, torture may be referred to as "work," "civic therapy," or even a "spiritual seance." Torturers are often addressed by nicknames (e.g., *El Carnicero*, "the Butcher"), or by the mocking title, "Doctor"; torture centres, such as the Villa Grimaldi in Santiago, may be known as "the Palace of Laughter." Methods of torture sound like satirical jargon: the Submarine, the Horseman, the Parrot's Perch, the Plane Ride, the Dragon Chair, the Telephone.

Among the myriad torture techniques reportedly used in various countries, the following are some of the commoner methods documented by Amnesty (some countries given as examples):

Actual photo of *la bandera*.

Physical Torture:
1) Beating—i.e., punching, kicking, or striking with truncheons, rifle butts, whips, etc.—of all parts of the body is common practice in many countries. Specifically, beating the soles of the feet with a hard rod (*falanga*) is a method mostly used in some Mediterranean and Middle Eastern states: e.g., by the former junta in Greece, the Guardia Civil in Franco's Spain, the Ethiopian Dergue, and some police officials in Turkey and Iraq.
2) Electric shock torture—where a cattle prod (*picana*), shock baton, or a live wire is applied to the limbs, mouth, nipples or genitals—is also widely used, figuring prominently in certain Latin American nations. It leaves few traces, though the pain of a shock may be excruciating enough to cause the prisoner to faint.
3) Burning with lighted cigarettes is common; less commonly, with acid (i.e., Chile), or hot oil (e.g., Ethiopia).
4) In *submarino*, the victim's head is submerged in water, urine or excrement, until he nearly suffocates.
5) Suspension in mid-air: the Parrot's Perch (*pau de arara*, invented by Brazilian officers), the Hook, the Airplane, *la bandera*.
6) Rape or sexual assault of females (occasionally, of males).
7) Exposure to cold, or immersion in cold water.
8) Prolonged standing of the victim (*planton*).

Psychiatric/Pharmacological Torture:

The forcible confinement of political dissidents to mental institutions or psychiatric wards has been indentified in several countries, most notably the Soviet Union. After receiving a spurious medical diagnosis of being "mentally ill" and "especially dangerous," the dissident is committed by the courts. Pharmacological abuse reported in Soviet psychiatric hospitals include the forced administration of neuroleptics — chlorpromazine, haloperidol and trifluoperazine — and sulfazine, a sulfur solution that evokes fever and intense discomfort. Political inmates in Rumania—diagnosed as having "paranoic schizophrenia," "senile dementia," or "oligophrenia" — receive depressants and punitive milk-iodine injections. From Chile

came the bizarre allegation in 1975 that some detainees had been given overdoses of cyclophosphamide, resulting in a fatal hemorrhagic cystitis after release from prison.

In general, drugs may work on four levels against the victim. The primary effect of a drug such as thiopental may be the victim's belief that it is a so-called "truth drug". Induction of debility is achieved by hallucinogens (LSD) that disrupt normal perception or conception, or by major tranquilizers that induce weakness, apathy or depression. The emetic effect of apomorphine, or the paralysis caused by suxamethonium, provoke acute distress, and therefore, dread. Finally, addiction to heroin, etc., produces physical dependency.

Psychological Torture:
Common methods include:
1) Compelling the victim to witness a fellow prisoner being assaulted or killed; there are documented cases, for example, of children being forced to watch their parents being tortured, or vice versa;
2) Simulated executions;
3) Hooding or blindfolding of the victim. Total sensory deprivation (employing "tactile obliteration," "white noise," etc.) was formerly used by British army interrogators against I.R.A. suspects.

The physiological and psychological damage wrought by torture must be understood in terms of its entire context, not just its specific techniques. Confinement in a cramped cell, isolation from outside contacts, fatiguing hard labour, humiliating abuse by the captors, and deprivation of food, water, sleep, medication, or sanitary facilities—these all serve to debilitate the victim. Cruel, capricious punishments, upon the torturer's whim, induce not only dread in the victim, but also a dependency on the torturer for the brief respites he may allow. Continuously subjected to the "4 D's" (disorientation, debilitation, dread, dependency), the victim's defences erode, enhancing the suffering caused by the torture itself, and rendering the victim susceptible to manipulation of his will.

The participation of doctors in the torture process of some countries has been alleged, often by the victims themselves. Collaboration may occur in any or all of the following ways:
1) After examining released (or dead) victims, the physician may falsify the medical records to "cover up" the practice of torture.
2) The doctor may neglect to adequately treat the injuries inflicted by torture.
3) During the torture session, the doctor may examine the victim to determine how much abuse can be endured. He may revive the victim, thus allowing the torturers to proceed.
4) Rarely, physicians themselves are the torturers. However, the incarceration of dissidents in psychiatric hospitals, and the use of drugs as torture, implies the involvement of medical personnel.
5) Physicians may contribute their knowledge or skills to the actual design of torture techniques. During the 1974 "April Revolution" in Portugal, for example, it was revealed that, under the Caetano regime, prison doctors had worked with the DGS (security police) in studying the resistance of political prisoners to torture. Psychiatrists at the Caxias Prison Complex, experimenting on hospital inmates, had perfected methods of sensory and sleep deprivation.

The very presence of the doctor, whether palliating or aggravating the victim's suffering, lends authenticity to the State's claim of attending to the prisoner's welfare. As an accomplice, the doctor himself may approve of the torture; may disapprove, but is coerced into involvement by threats against his career or life; may treat the victim, unaware of re-inforcing the torture process; or may otherwise be "caught in a conflict between his duty to treat and his moral duty to protest." In all cases, the exposure of involved physicians (and other medical personnel) would aid in discouraging those who participate willingly, and in protecting those who refuse to do so under duress.

Examination of Torture Victims

The problem of medical complicity in torture was one of several reasons prompting the formation of national Medical Groups as an essential component of Amnesty International's anti-torture campaign. Equally important was the need for the medical examination and documentation of torture victims, in order to institute appropriate treatment, and to confirm allegations of torture in a particular country. Hence, in 1974, the Danish Medical Group was formed, becoming the world's first medical "team" to systematically investigate torture symptoms and sequelae. Since then, Medical Groups have been established as part of Amnesty's National Sections, in 23 countries, including Canada; they now consist of over 4000 physicians, psychiatrists, dentists, nurses other health professionals, and interested people, as voluntary members.

The first major accomplishment of the Danish Medical Group was the standardized appraisal (history-taking and physical examination), between 1974 and 1976, of 67 claimed torture victims: 32 Chileans who had fled to Denmark, and 35 ex-prisoners in Greece, Table I. 13 of the 67 were women; the majority (57) were in their 20's or 30's. The Chileans were allegedly tortured from 2 weeks to 2 years prior to the examination; the Greeks, from 2 to 7 years previously (during the regime of "the Colonels"). Almost every victim reported being beaten, many with trauma (blows and/or electricity) to the head and genitalia. Infliction of *falanga* was confined to the Greeks; electrical torture, mostly to the Chileans.

Sequelae, both symptoms and signs, generally corresponded to the type of torture reportedly used: e.g. fractures due to trauma; gait disturbance and joint pain after *falanga*; sleep disturbances, headaches, and impaired hearing and mental function, due to cranial trauma. Only minor skin scarring resulted from electrical torture. A few subjects complained of sexual dysfunction; these all had suffered trauma to the head and/or genitals. Most subjects had loss of local sensitivity at torture-damaged areas. Noting the resemblance of the symptomatology to that of the "post-traumatic cerebral syndrome" and the "KZ syndrome" (Concentration Camp Survivor Syndrome), the Danish physicians concluded that "the worst and most en-

I. Reported Methods of Torture: (8 most frequent)	Chilean refugees (32)	Greek ex-prisoners (35)	Total (67)
Beating	30	33	63
Direct cranial trauma	18	25	43
Solitary confinement 2 wks.	10	26	36
Electrical torture	27	5	32
Falanga	-	29	29
Direct genital trauma	17	11	28
Enforced witnessing/over-hearing torture of others	13	12	25
Threats to family & friends	11	11	22
II. Symptoms After Torture: (8 most frequent)	(32)	(25)	(67)
Mental disturbance	17	23	40
Memory and concentration loss	17	13	30
Sleeping difficulties, nightmares	14	11	25
Headaches	12	11	23
Joint pain	6	10	16
Impaired gait	1	14	15
Impaired hearing	6	9	15
Abdominal pain	4	10	14
III. Mental Disturbances:	(17)	(23)	(40)
Neurosis (anxiety, depression, fear)	10	17	27
Character change (lability, irritability, introversion)	10	16	26
Psychosomatic (lethargy, fatigue)	3	6	9
IV. Objective Findings (manifest sequelae):	(21)	(24)	
Skin lesions	9	10	
Neurological	4	9	
Fractures	5	6	
Impaired hearing	3	7	
Mental	2	8	
Gait disturbance/arthrosis	0	10	

Partial list of results of examination of 67 torture victims. From Rasmussen, Dam and Nielsen, Evidence of Torture, A.I. Danish Medical Group, 1977.

during effects are psychological and neurological... 60 per cent of the victims exhibited some mental disturbance, particularly those who had been struck severely about the head."

The Danish group's investigation served as a prototype for the subsequent examinations of torture victims (mostly refugees) by Amnesty's other Medical Groups. The standard protocol that has been developed is approximately as follows:

1) Evaluation of the victim's general health.
2) The patient's history (health, occupation, social background) prior to the arrest and torture.
3) A detailed account of the torture episode, including:
a) the time, place, and manner of arrest;
b) the duration and conditions of imprisonment;
c) all incidents of physical or psychological maltreatment from the time of arrest to release;
d) events subsequent to release.
4) Physical examination; especially noting any findings that correlate with the history of torture.
5) Use of laboratory tests or X-rays to confirm any objective evidence.
6) Assessment of the patient's mental status and psychological health, with a view to his or her social readjustment.
7) Treatment of any current illness or injury, resulting from early sequelae of

torture.
8) Continuous follow-up to detect any late sequelae that may arise.

Refugees in Canada

In Canada, the systematic medical assessment of torture victims (all seeking refugee status in this country) began in 1977 with two Toronto physicians: Dr. Frederico Allodi of the Department of Psychiatry, University of Toronto, and Dr. Philip Berger, then at St. Michael's Hospital. Following the protocols of the Danish Medical Group, Dr. Berger during the year examined 11 Chileans who gave a history of torture that included beatings, deprivation of food and sleep, electric shocks, and frequent death threats. On examination, the commonest medical findings were neuropsychiatric disturbances, lumbar vertebral damage, and skin lesions; subjective complaints comprised mostly "anxiety, fear, sleeping difficulties, anorexia and weight loss, and low back pain." Like the Danish group, Dr. Berger found that "psychologic damage (was) the worst sequela of torture." In addition to emotional lability, nightmares, and crying episodes, the patients "appeared to be afraid of anyone wearing white coats or uniforms," since they had associated doctors with the torture process in Chile. In March, 1978, Dr. Berger presented these results at the Amnesty International Medical Seminar on "Torture and the Medical Profession" in Athens. Shortly thereafter, Drs. Berger, Allodi and several colleagues established the Canadian Medical Group under the auspices of Amnesty International.

Now consisting of some 150 members (plus 70 associated medical personnel), the Canadian Medical Group has been chiefly concerned with torture victims applying for refugee status. About 30 physicians, mostly in larger cities, have been examining and documenting cases of torture—an estimated 250 total so far. Most of these torture victims have been part of the influx of refugees from Latin America (some 7,000 since 1974), who have arrived because of the current atmosphere of repression in several countries there, and the relative accessibility of Canada via north-south air routes. For example, some Chileans have escaped on a tourist visa by boarding a commercial flight (dubbed the "Santiago Express"), then declaring themselves refugees upon arrival in a city such as Toronto, Montreal or Vancouver.

If he or she is a victim of torture, demonstrating such evidence to Canadian immigration authorities increases the applicant's chances of being granted refugee status. However, applicants in Ontario, for example, are eligible for OHIP (as of this writing, Jan. 1980) only once they are granted refugee status; therefore, they cannot easily obtain medical services in the interim. Acting on requests by the refugee applicant's lawyer, members of the Canadian Medical Group volunteer to conduct an exhaustive (often lasting 4 to 8 hours) medical and psychological assessment of the applicant. A clinically objective report is then submitted for review at an immigration hearing. Most torture victims thus examined are eventually accepted as refugees; without medical examinations, the "success rate" for admission has been about 35%. (Unsuccessful applicants may be deported to their native countries, where they risk facing official reprisals.)

Since the waiting period for a successful application is usually 6 months to 2 years, a further problem arises when, not infrequently, the victim is in immediate need of treatment for illness or disability. Although some GPs, specialists, dentists and nurses have volunteered their services, the lack of access to organized medicare has generally hampered proper care of these patients.

A "Torture Syndrome"

With the increasing examination and documentation of torture victims in Canada and elsewhere, certain sequelae of torture have been observed with striking frequency. "There is often a constellation of effects highly consistent with the history of torture alleged by the patient," says Dr. John Marshall, an occupational health consultant and Toronto member of the Canadian Medical Group. Such characteristic findings have emerged from Dr. Marshall's own assessment of Chilean refugees.

Among the physical sequelae are firstly, non-specific manifestations that are compatible with (but do not necessarily indicate) occurrence of torture: e.g., weight loss of over 10 kg, or skin lesions, bone fractures and broken teeth (which may be due to accidental trauma). Recurrent headaches, dizzy spells, and hearing loss are suggestive of severe blows to the head. On the shins of some victims, Dr. Marshall has noticed well-circumscribed oval scars—the result of being kicked by hard boots. A few lesions, unique in appearance and widely documented, are strongly suggestive of torture. Scars of cigarette burns are typically circular, about 1 cm in diameter, brown or whitish brown, and flat, with loss of tissue substance. Oval clusters of flat, brown "macules" (each macule 1 mm wide) are virtually diagnostic of electrical burns due to picana.

The characteristic psychiatric sequelae have been documented by Drs. F. Allodi and G. Cowgill in a Canadian study of 41 Latin American refugees. Most of the subjects had been violently seized by soldiers, from a few months to 6 years previously, and then tortured while in detention. In addition to sustaining physical damage, the patients suffered, to varying degrees, from an array of psychiatric stigmata. The most common symptoms were "psychosomatic" (insomnia, nightmares, headaches, nervousness, and symptoms of sympathetic hyperactivity), and "affective" (anxiety, depression, or fearfulness and phobias). About one-half had "behavioural and personality changes" (irritability, impulsiveness, withdrawal, etc.); some had impaired "mental function" (loss of memory and ability to concentrate). Dr. Allodi noted that all of the patients exhibited a "homogeneous disorder" of psychiatric symptoms reminiscent of "Gross Stress Reaction," and to a lessor degree, "post-traumatic neurosis." (All had been in "excellent" health prior to arrest.)

Sequelae such as these comprise the tentatively-labelled "torture syndrome." Such evidence cannot irrefutably prove causation, but one

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Epilepsy and Excitable Cells

Vladimir Shishkov 8T1

In 400 B.C., Hippocrates wrote the first scientific monograph on epilepsy. He and his followers believed that attacks were a result of changes in the brain's consistency due to factors such as the sun, cold and wind. Even though these were vague stimuli, Hippocratics were the earliest group of men to denounce magical treatment of supposed spiritual manifestations. So it was that morbus divinus (sacred disease) became morbus major (great disease) and found its way into Medieval French as 'grand mal.'

After Hippocrates, three main schools of thought were formed. The more important were followers of Hippocrates, or dogmatists, who felt that systematic anatomical and physiological studies were necessary in order to find the underlying or 'hidden' causes of disease. The Empiric and Methodist views were largely ephemeral and any which did remain, eventually paid attention to causes.

Galen, appearing about five centuries following Hippocrates, became the outstanding figure of ancient medical science. He divided epilepsy into three forms:

1) an idiopathic disease of the brain,
2) involvement of the brain originating from the cardia (G.I. tract) and
3) involvement of the brain originating from any other part of the body including the extremities.

Galen was the first to divide epilepsy into primary and secondary forms in terms of etiology, albeit implicitly. To substantiate his second type, he astutely observed that *"In persons with an abundance of bile and weakness, ichors may accumulate and give rise to exhalations which affect the brain and may give rise to epilepsy."* It is interesting that the third type had no causal significance at all. It was based on his observation of the movement of the aura "originating in the lower leg, climbing upwards through the thigh and further through the flank and side to the neck and as far as the head; but as soon as it had touched the latter, it was no longer able to be followed." This account of 'Jacksonian Epilepsy' was given to Galen by a thirteen year old boy who, when asked exactly what rose to the head replied, "It was like a cold breeze."

The Medieval Period contributed only variations of Galen's ancient theories but was poisoned by new theological speculations.

The late Renaissance Period gave rise to so called iatrochemists and iatrophysicists who became prominent in the Period of Enlightenment. If for no other reason, their dabbling had created a major influence on the rejection of the demonic nature of epilepsy. Attempts to explain epilepsy in terms of physics and chemistry were ambitious but well ahead of their technology. Today, we are similarly limited.

It was not until 1870, seventeen centuries after Galen, that Fritsch and Hitzig proved experimentally the motor excitability of the cortex and Jackson theorized that convulsions may arise from this region.

Anatomical Foundations

Today we are, at best, able to subdivide primary and secondary causes of epilepsy only more explicitly than Galen did eighteen centuries ago. In this light, it is not surprising that many investigations proceeded along anatomical lines. The steps by which these occurred will be described because they serve to illustrate the maturation of hypothesis into fact.

Although Galen was among the first men to document a unilateral seizure (vide supra), Bravais (1827) received the recognition. More important than this, Bravais distinguished 'hemiplegic epilepsy' (focal) from 'general epilepsy' (grand mal and petit mal) and it was chance that led most of the work at this time to center around the unilateral form, perhaps because it appeared a more elementary or unique phenomenon. In the same year, Bright carried Bravais's observations a step further by looking at the brains of two men suffering from one-sided epilepsy. In the first case, an autopsy showed a small almond-shaped tumour to have "indented itself into the posterior lobe of the left hemishere of the brain." This matched well with a ten year history of headaches and visual disturbances culminating in right sided seizures. The second patient was well until he fell from a cart onto his head and thereafter had left-sided fits very much like the first case but did not lose the ability to speak. A dissection revealed that the

dura mater overlying the posterior lobes of the cerebrum was ossified in such a way that "considerable portions, including the whole thickness of the cineritious substance (grey matter), tore away with the membrane." From this, Bright decided that epilepsy was an irritation of the brain surface. The implication that such lesions had somehow affected the exterior portion of the hemispheres lacked both structural and functional precision but did nonetheless serve as a starting point for others.

In his studies on meningitis, Todd (1809-1860) knew that one-sided convulsions were associated with lesions of the opposite hemisphere. However, his particular interest lay in seizures arising in patients with uraemia. *"The peculiar features of an epileptic seizure are due to the gradual accumulation of a morbid material in the blood, until it reaches such an amount that it operates upon the brain in, as it were, an explosive manner; in other words, the influence of the morbid matter, when in sufficient quantity, excites a highly polarized state of the brain, or of certain parts of it, and these discharge their nervous power upon certain other parts of the cerebrospinal center in such a way as to give rise to the phenomena of the fit."* (Notice the similarity of this 'humoral theory of epilepsy' and Galen's description of hepatic encephalopathy.)

Not until 1864, when Hughlings Jackson logically integrated the anatomical and physiological theories of his predecessors, did the problem of epilepsy become clearer. He drew a parallel between hemiplegia and unilateral epilepsy stating that "paralysis in ordinary hemiplegia was due to destroying lesions; convulsions, on the other hand, to discharging lesions." On the one hand he looked for a specific kind of lesion that would produce seizures and on the other, tried to locate a specific area of the brain affected and relate it to clinical observations.

In 1870, Fritsch and Hitzig discovered the motor area of the cortex by applying weak currents to the surface of a hemisphere and found that specific groups of muscles were activated on the opposite side — stronger currents led to convulsions. Jackson, who assumed that all parts of the body were represented in every part of the corpus striatum had experimental proof of the localization of function. He now defined epilepsy as "the name for occasional, sudden, excessive, rapid and local discharges of grey matter."

There remained, however, the problem of generalized epilepsy which included those instances where consciousness was temporarily lost. Since grey matter included the corpus striatum and cerebral cortex, Jackson began to consider the nervous system as a hierarchy, describing three levels. The lowest consisted of the spinal cord, the medulla oblongata and pons. The middle level was the motor region of the cerebral cortex and the corpus striatum. The highest, or frontal area integrated movements subserved by the middle level. Postulating that discharges could spread from one level to another, Jackson thought that involvement of the frontal lobes, regardless of the original focus, resulted in loss of consciousness. Furthermore, if the discharges here were weak, then petit mal would occur. Stronger activity not only produced a loss of consciousness but also severe convulsions involving all extremities. Jackson's division of generalized epilepsy into the grand mal and petit mal forms remains to this day. He also realized that auras were sometimes predominantly motor or sensory but in some cases appeared mixed. For example, that thirteen year old patient of Galen which experienced a 'cold breeze' travelling from his foot to his head before he lost consciousness had a sensory aura (vide supra). Others starting with twitching toes or fingers had motor auras. The anatomical substrate of the mixed aura lends itself to the present day term 'sensorimotor cortex.'

Hughlings Jackson could not get a firm grasp of generalized epilepsy because he was convinced that consciousness resulted solely from the smooth operaion of the frontal lobes. In addition, although well aware that there was a point to point arrangement of body parts in the corpus striatum and cerebral cortex, he was not able to conceptualize exactly how this took place. Both these difficulties were for the most part resolved by Wilder Penfield.

In 1946, Penfield came into direct opposition with Jackson's thesis by stating that the highest level of integration was not located in the frontal lobes but rather in the subcortical areas of grey matter within the higher brainstem. This concept gave birth to the term 'centrencephalic'. In Penfield's own words it involved a system of *"neuronal circuits in which activity of both hemispheres was somehow summarized and fused — circuits the activation of which made conscious planning possible."* Three years later Moruzzi and Magoun discovered the Reticular Activating System, a collective organization of grey and white matter in the brainstem, the function of which was to diffusely arouse specific cortical areas and prepare them to react to specific sensory signals. Suppose that discharging impulses either arose from or spread to this area in a disorganized manner and temporarily inactivated it—a loss of consciousness would result. If we return to Galen's patient, this is exactly what happened. When the 'cold breeze' reached his face he could no longer follow it. In other words, he experienced a unilateral sensory aura before he lost consciousness. After this, cramping of the hands, clenching of the teeth, kicking of the legs, foaming at the mouth and awkward deviation of the eyes displayed the true generalized epileptic attack. Evidently, the original discharge in the hemisphere spread to the centrencephalon or reticular formation. Penfield's quantitative map of the sensorimotor strip in terms of the famous homunculus finally crystallized Jackson's notion that a specific point to point body-brain relationship existed.

The Nature of Excitability

The terms centrencephalic and generalized epilepsy are used synonymously today. Focal epilepsy usually occurs with demonstrable pathology such as a tumour, an old scar or trauma to one of the hemispheres but the causes of generalized epilepsy remain largely unknown. Indeed, another synonym for it is idiopathic epilepsy, occuring

in over seventy per cent of all epileptic patients so that it really is a matter of major concern. Any scientific work in a specific area these days yields a rather overwhelming number of details, only some of which eventually open doors to the truth—epilepsy is no exception. Therefore, the purpose of this section is to shed some light on the normal states of excitable cells.

What is responsible for the excitability of neurons and efficient propagation of impulses from one cell to another? Histologically, there are two components to a nervous system: the neuron (cell body with appendages) and connecting synapses. The neuron, resting in a sea of extracellular fluid, is able to exist in a polarized state. This resting membrane potential is governed mainly by K^+ ions that tend to diffuse from the inside of the cell to the outside along a concentration gradient. Diffusion of K^+ ions creates an electrical force so that an electrical potential difference is constantly maintained between the inside and outside of cells. Na^+ ions do not readily diffuse into the cell in the resulting state. This is because Na^+ channels, specifically arranged protein, do not permit Na^+ ions to pass through readily. However, when a stimulus creates a local electrical field, the protein changes conformation so that a new molecular arrangement within the channel permits Na^+ to enter the cell. This inward diffusion of Na^+ ions creates an electrical force, analogous to the way K^+ ions maintain the resting potential, which changes the conformation of adjacent Na^+ channels so that propagation of the impulse can occur. The reason impulses move in one direction only is this: after Na^+ channels open, they reclose to a tighter state than during the resting state. This period of time, called the refractory period, does not allow any further electrical force to affect the channel. When the Na^+/K^+ pump restores the resting potential, the Na^+ channel resumes its resting molecular state, ready for further impulse transmission. K^+ channels in excitable membrane are likewise important because they govern the resting membrane potential that in turn governs the threshold potential, or electrical intensity just sufficient to produce an action potential. Glial cells, making up about one half of the mammalian brain are thought to act as 'spatial buffers' for neurons. They too are necessary for maintenance of the resting potential, although indirectly.

We now come to the other major component of a nervous system: the synapse. It can be electrical or chemical. Electrical synapses, such as those found in electrical eels, are much faster than chemical ones. They are composed of gap junctions, which are similar in nature to Na^+ and K^+ channels but rather than connecting a neuron to its external environment, they join it to other neurons and operate bidirectionally.

Chemical transmission involves either excitatory or inhibitory neurotransmitters. These interact with receptor molecules that are part of postsynaptic 'permeability channels.' Each type can open permeability channels for certain ions whose inward movement leads either to excitation (depolarization, EPSP) or inhibition (hyperpolarization, IPSP). It is the permeability channel's conformational change that governs which ions will enter and which will not. One transmitter can produce either excitation or inhibition depending on what receptor happens to be part of the permeability channel postsynaptically. The difference between action potentials and synaptic potentials is that the former are 'all-or-none' compared to the latter which are graded, having the ability to summate. Presynaptic terminals contain Ca^{++} channels which are opened by action potentials. They are responsible for efficient neurotransmitter release.

With this physiology in mind, what is the effect of surrounding fluid or 'milieu interieur' on the neuron and synapse? To say that it is significant would be to minimize its importance. Let me give you an historical example. During the Medieval Period a notion that epilepsy was somehow associated with the moon's cycle became known as lunacy. The term was also used to describe recurrent mental illnesses. In 1843 Moreau set out to disprove the theory with a study comprising 42,637 seizures of 108 male epileptic patients in the course of five years. Although he found no relation between attacks and phases of the moon, circadian rhythms have certainly been shown to occur in the nervous system since then. Should he have performed the same study with women, a relation may well have turned out since women are generally more phasic than men.

Adrenocorticotrophic hormone (ACTH) is one compound in mammals secreted in diurnal rhythm. ACTH not only affects metabolism through other hormones which also fluctuate diurnally but it influences the activity of neurons. Steroids released by ACTH from the adrenal gland will enter neurons and bind to DNA, indirectly affecting the synthesis of proteins and peptides that are themselves putative neurotransmitters. By affecting electrolyte homeostasis, steroids can alter the resting membrane potential and threshold. In this isolated example it is my intention only to show that the 'milieu interieur' is important in the proper functioning of both neurons and their synapses.

Where Can the Problem Lie?

I would now like to discuss in hypothetical terms how an individual can become susceptible to seizures.

Let us consider the membrane of neurons first. The Na^+, K^+ and Ca^{++} channels consist at least to some extent of tertiary proteins. If a single amino acid is miscoded the conformation of the channel becomes different. Altered K^+ channels change the resting potential and similarly Na^+ channels are not able to maintain appropriate refractory periods. A shortened refractory period leads more easily to circus movements, analogous to the way they occur in cardiac muscle. Poorly functioning Ca^{++} channels lower the amount of neurotransmitter released but they can also be excessively permeable, leading to oversecretion. Another way circus movements can be created is by a lowered mass of neuroglia. By lessening buffer action, crosstalk between axons, dendrites and cell bodies is encouraged. Epileptologists speak of 'synchromy' whereas cardiologists refer to 'ventricular tachycardia'. Indeed, the EEG fin-

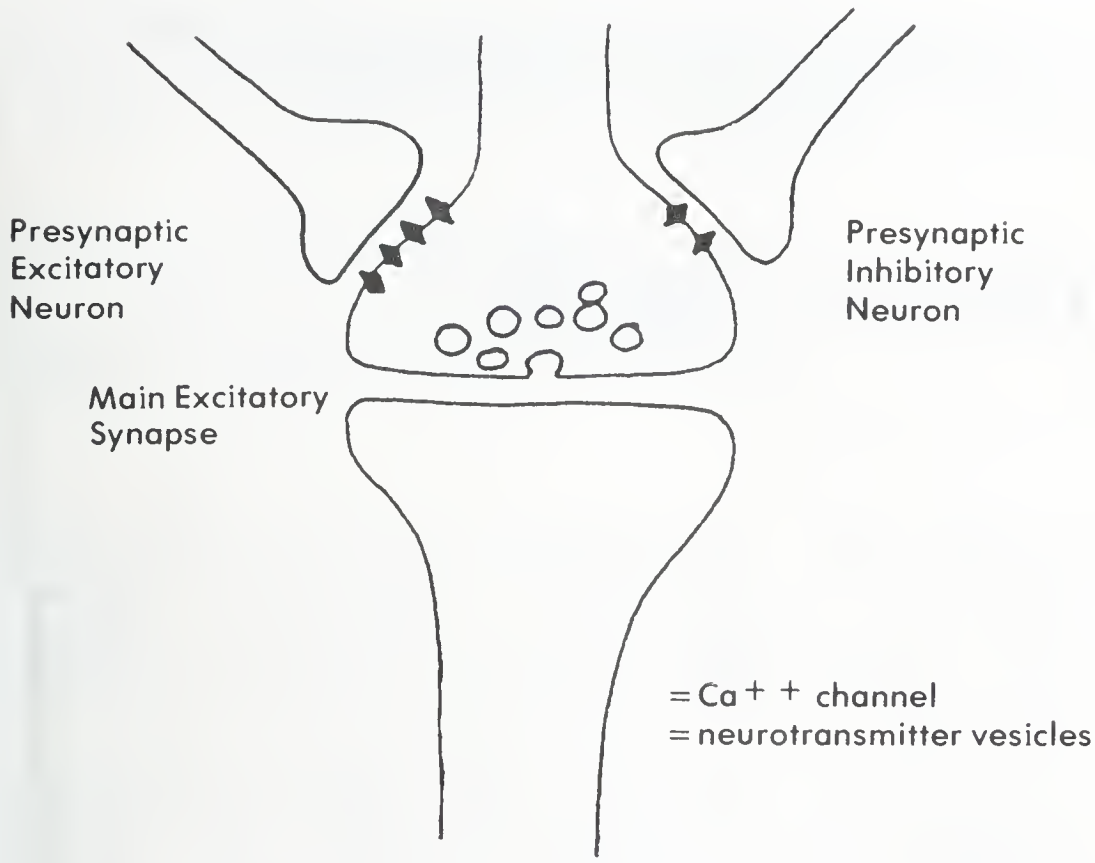

Figure 1: Facilitation and Habituation (Modified after Kandel)

dings of petit mal (a generalized epilepsy) are remarkably similar to the ECG pattern of ventricular tachycardia.

As mentioned above, electrical synaptic transmission is mediated by gap junctions, this occuring at much higher speeds than at chemical synapses. Lack of genetic regulation of protein synthesis could result in larger numbers of such gap junctions leading to premature and uncontrolled activation of certain circuits. If the neurons stimulated in such a manner are excitatory they can trigger others in the vicinity. Since synaptic potentials can summate, spread of unwanted impulses could easily follow. In order that a neurotransmitter exert any effect, it must bind to the postsynaptic receptor. Again, a single incorrect amino acid in the receptor or any other part of the permeability channel would significantly lower its affinity for the neurotransmitter. What is the effect of such a condition at inhibitory synapses? A lessening of inhibition permitting an augmented degree of excitability in turn creating fertile ground for seizure formation. Presynaptically, the same effect is observed with poorly functioning Ca channels. In general terms what these examples show is that a nervous system with too little inhibition or too much excitation is prone to seizure activity. It is also not surprising that we cannot see any anatomic lesion in many cases of idiopathic epilepsy.

Is it possibile that some seizures are acquired by a process of learning without any underlying biochemical lesions of an altered 'milieu interieur'? Around 1850 Charcot noticed that many of his hysterical patients were having seizures indistinguishable from true epileptic fits. Were these fits conversation reactions? Consider the following explanation with reference to Figure 1: two complementary phenomena present in a healthy nervous system are habituation (mediated by presynaptic inhibition) and facilitation (mediated by presynaptic excitation). Both presynapses can exert immediate as well as lasting effects on the main excitatory synapse. As previously described, Ca + + ions are required for neurotransmitter release into the synaptic gap. When the excitatory presynaptic neuron is activated, the permeability of Ca + + channels is increased so that more neurotransmitter is capable of being extruded into the synaptic gap. The opposite effect is created by the inhibitory presynapse. In animal experiments, where intracellular recordings can be made, habituation and facilitation have been shown to last up to several weeks. Why does an individual become good at a task if he practises it? Neuron pathways subserving the task become efficient by means of facilitation. Similarly, a parent studying for exams can learn to ignore the noise of his children by habituation. The patient with hysterical neurosis learns to lessen anxiety by developing virtually any symptom including a seizure. The physiological substrate of such behaviour may be facilitation creating a 'favoured' pathway that sets off a previously suppressed focus of excitable cells.

Conclusion

In this essay I have chosen to describe only a few of the ways excitable cells behave and misbehave. With the many possible factors responsible for the idiopathic epilepsies we are confronted by what appears to be an unsolvable problem. This is why it is best to end with the words of Hughlings Jackson: *"Working on a novel method, I run continual risk of making novel blunders. But in thinking for one's self there are certain kinds of blunders which almost must be made. And it is always easy to avoid appearing to go far wrong if one does not go far from the beaten track."*□

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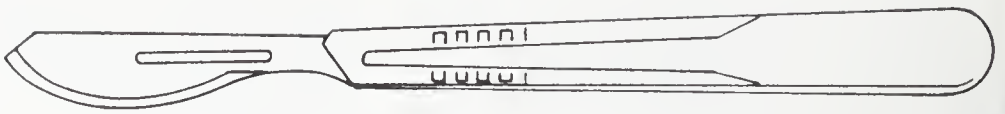


A Case Against Placebo Therapy

Viewpoint:

The concept of placebo therapy often arises in the context of its amazing effectiveness. Classically, I envisage the doctor winking to his collegue after "curing" a particularly pestering patient with a sugar pill. In many situations, it seems that placebo preparations are appropriate because they effectively relieve certain symptoms. Yet I contend that there is no place in medicine for therapy by placebo, in the pure sense of the word.

What do I mean by "placebo, in the pure sense of the word?" - The administration of a pharmacologically inactive substance in pretense of specific treatment of given symptoms. This definition does not include the use of placebo in controlled experiments in which the subject is aware that he may be receiving a placebo; nor does it necessarily include the use of a placebo trial in diagnosis. Given no better explanation, one is forced to believe that placebo preparations work via the psyche; that the patient's belief that his symptoms will improve, a psychological phenomenon, is translated into a physiological effect. It follows, then, that symptoms treatable by placebo are partially or entirely of psychogenic origin, and/or that psychogenic processes can overcome organic disease.

There may be good medical reasons for avoiding placebo therapy. An improvement in the patient's symptoms following the non-specific treatment by placebo may mask undiagnosed organic disease. Such masking is analogous to the immediate treatment of the characteristic pain of gastric ulcer with antacids. While the pain may diminish, a few cases of gastric cancer may be missed. Similarly, a presumably psychogenic pain may improve with placebo if the pain indeed has a psychogenic component, but eventually the main source of the pain may be found to be serious organic disease. In other words, placebo, by treating symptoms rather than the underlying cause, may allow the underlying cause to progress undiagnosed. Furthermore, the scientific basic for placebo therapy is fuzzy at best. Not the best physician it the world could establish a physiological or biochemical mechanism for its effectiveness. Empirical studies to give good evidence for the success of placebo in specific clinical presentations are probably also lacking. The physician is left to use that vague skill of "clinical judgement" in order to decide on the use of placebo, but that is not science. Earlier in this century, some physicians used their clinical judgement to advise people to smoke in order to clear phlegm from their lungs. Since then, statistical studies have shown that cigarette smoking is implicated in many diseases, most notably lung cancer.

Suppose that the exclusion of all organic causes for a patient's symptoms is accomplished by a thorough investigation of a comprehensive list of differential diagnoses, and that it is ascertained to a high degree that there is no explanation for the symptoms other than supratentorial overlay. Then the use of placebo can still be questioned for medical reasons: if a set of symptoms is a manifestation of a psychological disturbance and this set of symptoms is improved by the placebo, then is there not a possibility that a new set of symptoms would replace the old one? For example, headache and nausea may be replaced by chronic depression, which may be less obvious than the former symptoms.

But suppose even further that the placebo turns out to be effective in relieving the symptoms without creating new ones, thus achieving an equivalent result to effective specific therapy. Then I still contend that placebo should not be used, although my reason is somewhat intangible in the world of statistical studies and the scientific method. My reason revolves around such ill-defined concepts as honesty and respect for the patient's human dignity. There is something patronizing and condescending in deceiving the patient "for his own good." From a physician's point of view, the elimination of symptoms may appear as a top priority, but the question arises: is it not equally or more important to respect the patient's dignity and to be honest with him? There must be more to health than the absence of symptoms. Living a life devoid of pain and anguish could not be the be all and end all of existence. Not that I want to be pained and anguished! On the contrary, in every day life I strive to minimize any suffering, but I don't spend every minute concentrating on the avoidance of pain. Health is not only the absence of symptoms; to me, health is the ability to pursue one's fortunes and misfortunes; the freedom to sink so low that later the high is just incredibly good; and the chance to use one's talents or squander them if they are not desired.

If I have certain symptoms caused by a psychogenic process, I would want to know that! I would like to have the opportunity to work out the problems which manifest themselves in such a way! Granted, if I cannot work these out myself, I may need the help of a psychiatrist. And granted, if the problem is due to an imbalance of certain neurotransmitters in my limbic system I may require specific remedies such as anti-depressants. But to merely sweep the dirt under the carpet by giving me a sugar pill and convincing me that the symptoms will disappear —

(continued on page 95)

Aerospace Medicine: Past, Present and Future

Joseph G. Parravano 8T2

The previously acquired knowledge in the field of Space Medicine (the study of human responses to prolonged space habitation) will be quite instrumental in the success of future space endeavors but, concomitantly, the engineering capabilities will determine the extent, in terms of feasibility, of the missions. Present advances in Engineering technology have proceeded beyond the point of temporary space missions and it has been said that the state-of-the-art is usually 5-10 years ahead of the published technical advancements but remains 100 years behind science fiction. The latter gap will eventually narrow and this may, in part, be due to an increase in knowledge of the space aspect of medical science. Knowledge of the effects of space has slowly been increasing and may soon make a breakthrough subsequent to the NASA/ESA (National Aeronautics and Space Administration/European Space Agency) joint effort to put the Life Sciences Spacelab I into orbit early in 1981.

The American Space Program will soon be taking its next "step" in space exploration. With the expected launch of the Space Shuttle "Columbia" late in 1980, man will be able to conduct all the necessary long term research projects which will answer many of the questions that have surfaced since the advent of space exploration. The Space Shuttle "Enterprise," the prototype, has already completed its preliminary trials by successfully gliding to a landing after having been launched from a 747 jetliner at 30,000 ft. altitude. Conventional boosters will be used to place future shuttles into orbit. The shuttle program includes plans for the construction of 6 shuttles each reusable for 50 flights. These reusable Low Earth Orbiters (LEO) will make it possible to place experimental packages in orbit. The experiment would run its course and then be retrieved on a later flight. The long term goal of the shuttle program is to deliver raw materials and manpower to a low earth orbit, to manufacture and assemble the components in low orbit, and then to boost the assembled structure to geosynchronous earth orbit (GEO-has a period of 24 hours and remains over a fixed point on the earth's surface), Figure 1. Achievement of the long term goal can be realized in the construction of Solar Power Satellites (SPS). As conceived, the SPS would collect solar energy, convert it to microwaves and then beam the energy to collecting antennae on earth for conversion to useable electricity.

After countless studies during the past ten years, the U.S. Department of Energy and the National Aeronautics and Space Administration have developed a conceptual design for an SPS. The reference system offers a guideline for the construction of two-5 Gigawatt satellites, with accompanying ground stations, every year for 30 years. Such work could start in the 1990's. Two of these satellites would be capable of supplying the electrical power requirements of the entire state of Florida. The total present electrical needs of the U.S. could be supplied by 100 satellites and the total Canadian needs could be supplied by 12 satellites. One satellite supplies the power equivalent to 2½ Pickering Nuclear Power Generating Plants.

The reference SPS features a 10 km × 5 km × 500 meter satellite with a planar array of photovoltaic cells, Figure II. At one end of the satellite a 1 km diameter antenna transmits microwave energy to earth. A 10 km × 13 km elliptical receiving-rectifying antenna (rectenna) on earth converts the microwaves to direct current. The total system cost to supply 300 GW is put at three-quarters of a trillion dollars. However, similar expenditures would be required to build any 300 GW power generation system.

Assembly in space is necessary since the truss structure adequate for its function in space would not be able to withstand the high g-loads at launch and a sufficiently reinforced structure designed to withstand launch would impose severe weight restrictions and enormous, if not impossible, power requirements, Figure III. NASA estimates that 550 workers would be needed to build a solar satellite and this presents a problem in keeping that many people healthy and comfortable in space. The living quarters would be based in multi-crew orbiting laboratories which are made feasible by the shuttle acting as a crew and cargo bus.

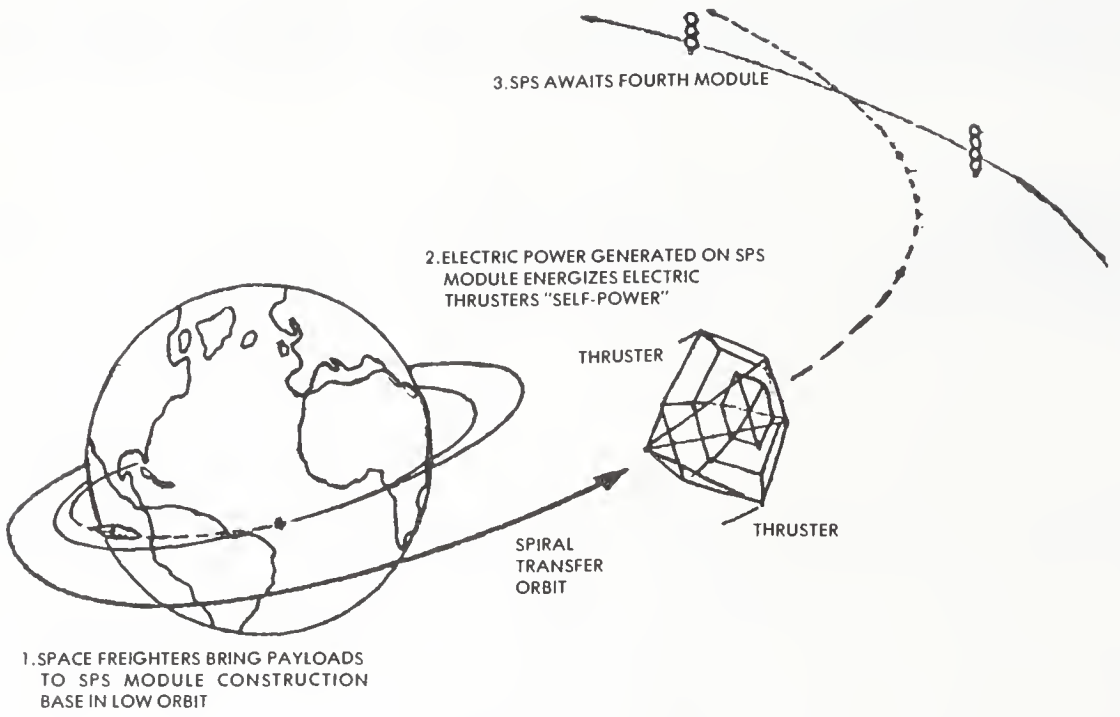

3.SPS AWAITS FOURTH MODULE
2.ELECTRIC POWER GENERATED ON SPS MODULE ENERGIZES ELECTRIC THRUSTERS "SELF-POWER"
THRUSTER
THRUSTER
SPIRAL TRANSFER ORBIT
1.SPACE FREIGHTERS BRING PAYLOADS TO SPS MODULE CONSTRUCTION BASE IN LOW ORBIT

Figure I: Transferring the SPS to high orbit.

Many human medical implications arise in such an endeavor. The problems are all due to the intrinsic properties of space itself and to the precarious situation space presents. Much data has been accumulated from the manned missions originating with the Mercury project through to Skylab and Salyut. These presented various indications of the biomedical problems involved and created an impetus to the medical research of extraterrestial health management.

Space medicine has been fairly active throughout the space program and began when Dr. Hubertus Strughold developed the first Department of Space Medical Studies. He collected various physicists and life scientists in 1949 to consider the effects of space on man. The

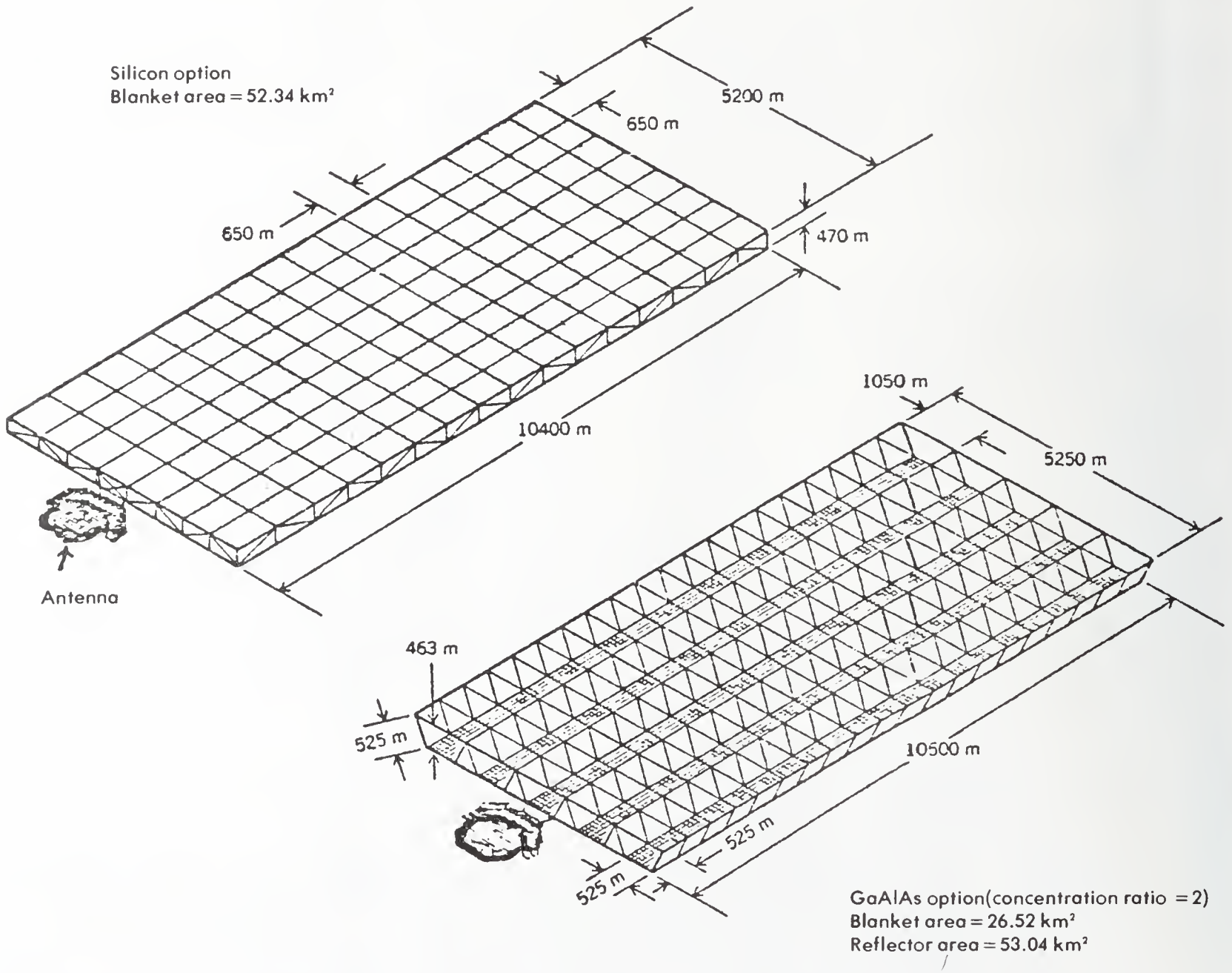


Figure 2: Depicting the reference SPS system, shown here with the possible options of photovoltaic cells.

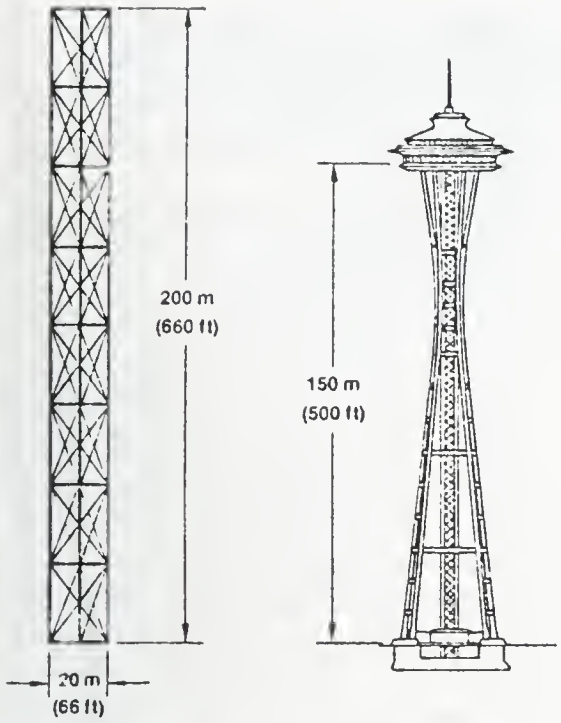


Figure III: Space and ground structures in comparison reveals the advantages of construction in space. On the right, Seattle's Space Needle tower(8660 tons) took 6 months to build with a crew of 50 men. The space structure on the left(1.5 tons) would take 3 hours with a crew of 2 men in zero gravity.

culmination of those efforts gave the U.S. the capability to safely put 3 men on the moon a mere 20 years later. More recently, the American Skylab and the Soviet Salyut manned orbital laboratories have shown that man can live and work in space for many months. They have also revealed the existence of many biomedical factors affecting man in extended durations in space.

To understand the implications of space on the human physiological and psychological system it would be helpful to highlight the medical aspects of the space program since its inception.

Mercury Program 1961-63

It was at this time that the U.S. and the U.S.S.R. deemed it necessary to send experimental animals into space to determine the validity of various plausible theories developed which predicted catastrophic failures of many vital functions when an animal was thrust into a weightless environment. This was not the only hazard present. There would also be ionizing radiation, temperature and humidity, accelerations, circadian rhythm, atmosphere, noise, and vibration stresses to contend with.

Some of the postulated effects due to null gravity included: anorexia, nausea, disorientation, sleepiness, fatigue, restlessness, euphoria, hallucinations, decreased g-tolerance, gastrointestinal disorder, urinary retention, diuresis, muscular incoordination, muscle atrophy, demineralization of bone, renal calculi, motion sickness, pulmonary atelectasis, tachycardia, hypertension, hypotension, cardiac arrhythmias, post-flight syncope, decreased exercise capacity, reduced blood volume, reduced plasma volume, dehydration, weight loss, and infectious illnesses. Only a few of these were later shown to be valid concerns.

A few of the later manned Mercury-Atlas missions demonstrated the cardiovascular problems of orthostatic intolerance and presyncope on standing, dehydration, and haemoconcentration. These effects were found in the Mercury-Atlas 8 and 9 missions which were of 9 hours and 34 hours duration, respectively.

Project Mercury is now history. Decades of investigation of aerodynamics, rocket propulsion, celestial mechanics, aerospace medicine, and electronics were collected with Project Mercury which finally took man beyond his atmosphere and into space orbit. Man's potential for mobility in his universe was confirmed and it was left for Projects Gemini and Apollo to make use of that potential.

Gemini Program 1965-66

Project Gemini was one of the early pioneering efforts in developing the space capability of the U.S. It took advantage of the knowledge gained in Project Mercury. The most significant achievements of Gemini involved precision manoeuvring in orbit and a major extension of the duration of manned space flights. This included the first rendezvous in orbit of one spacecraft with another and the docking of two spacecraft together.

This program allowed some quantification of the effects (found in Mercury Project) with flights of 2 weeks in duration. It was found that cardiovascular reflexes which regulate blood flow under a continuous earth gravity were altered by the removal of gravity. Consistent and predictable changes were found. These changes consisted of a moderate loss of red cell mass, a moderate orthostatic intolerance, a moderate loss of exercise capacity, a minimal loss of bone density, a minimal loss of bone calcium and muscle nitrogen, and a high metabolic cost for extra vehicular activity (EVA).

Apollo Program 1968-72

In these 5 years, 11 manned missions were completed: 4 prelunar flights (Apollo 7 to 10), the first lunar landing (Apollo 11), and six subsequent exploratory operations (Apollo 12 to 17). Apollo 13 returned to earth, after a partial lunar orbit, due to complications in the service module.

Biomedical studies in Apollo missions substantiated the results found in the previous excursions. It was also at this time that vestibular disturbances were added to the gamut of significant medical findings.

Vestibular disturbances with nausea were noted by Soviet Cosmonaut Titov during his 25 hr. 18 min. Vostok 2 flight on August 6, 1961, and by crews of later Soviet flights. No American astronauts had experienced any motion sickness symptoms until the early Apollo experience. However, the anorexia and reduced caloric intake observed in Gemini and later Apollo flights may have been early symptoms of vestibular disturbance. The delayed appearance in the American space program was probably due to the in-flight immobility of the crewman and the absence of any rotation in the Mercury and Gemini flights.

Other confirmed findings in the Apollo flights were post flight dehydration, post flight orthostatic tolerance decrease, postflight reduction in exercise capacity, decreased red cell mass and plasma volume.

An occurence of cardiac arrhythmia in two of the crewmen of Apollo 15 must be mentioned. They experienced a single run of bigeminy during the mission—the first time this was ever noticed. A dietary deficiency of potassium was suspect but, after analysis of the mission simulation studies, this could not be proven. The etiology remains obscure. Two

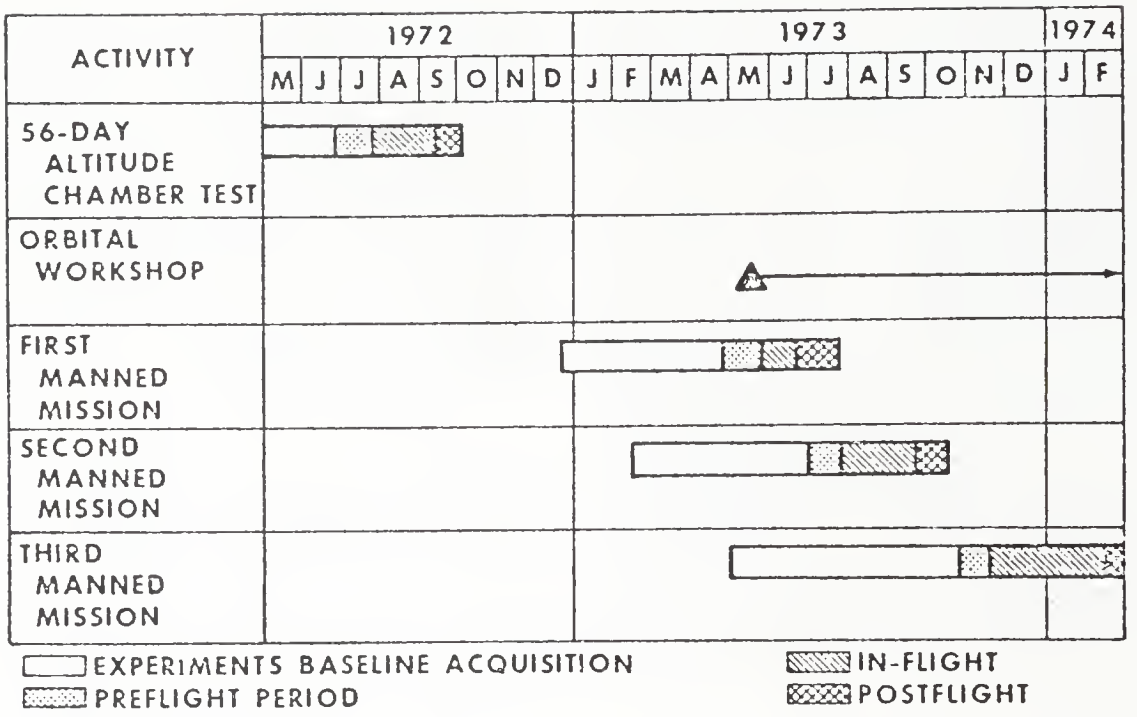


Figure IV

short bursts (9 and 17 beats) of nodal tachycardia were observed in John Glenn during the postponed Mercury-Atlas 6 launch attempt in 1962. At the time, he was lying in his couch preparing for final countdown. No other arrhythmias appeared during the flight nor after his historic 5 hour orbital flight.

Skylab Program 1973-74

Originally called the Apollo Applications Program, the Skylab Program had the principal objectives: to study man, his Earth, and his Sun.

Major medical subsystems were provided in the Skylab Orbital Workshop (OWS) to provide sustenance, health integrity, and to conduct medical studies. On the order of 900 kg of food was stowed on board the OWS at launch consisting of the necessary caloric, mineral, and other dietary requirements. Frozen foods, thermostabilized foods, and freeze dried foods comprised the seventy food types available to the crew when planning their inflight diets. They were required to consume the same foods for three weeks prior to flight and for 18 days postflight. The galley contained a freezer, food chiller, and hot and cold water outlets. Provisions were made for the consumption of food in a seated position and employing normal utensils.

The fecal matter was disposed of by (here comes the answer to that common question) collecting it in a gas permeable, but not water permeable, bag attached to a form fitted seat. An electric blower would be actuated during use to provide positive airflow from the perineal area and to carry the feces into the collection bag. The mass of the bag was measured after each defecation, then the contents were freeze-dried and stored for subsequent analysis back on Earth. Urine was collected for every period of 24 hours in a pooling bag (replaced with a new bag every 24 hours). A centrifugal fluid/gas separator created a positive airflow to carry the urine to the pooling bag. A measured quantity of lithium chloride was added, preflight, to each bag and the volume of urine was measured by lithium dilution. Aliquots of 120 ml were freeze-dried from each sample and stored for subsequent analysis on earth while the remainder was stored for disposal upon return.

Provisions for personal hygiene included wet wipes, towels, tooth brushes, razors, deodorants, etc. A shower, provided for full body bathing, was contained in a collapsible cylindrical bag. Microbiological studies conducted postflight determined the personal hygiene techniques to be adequate.

The personal bioinstrumentation would be engaged during crucial mission phases such as launch and extra-vehicular activities. This consisted of ECG and respiratory equipment which allowed collection of data from electrodes affixed to the body. The signal conditioners were contained in a belt worn at the same time.

The inflight medical support system was designed for diagnosis and treatment as required. Included were diagnostic, minor surgery, dental, catheterization, and bandaging equipment. Sixty-two medications, that may have been needed, were supplied along with petri dishes, an incubator, a microscope, and a slide stainer. Airborne and surface samples were collected during flight and analysed with the microbiological equipment. The equipment was complemented by 80 hours of paramedical training for each crewman.

Cardiovascular counter pressure garments were provided for each crewman. They were designed to mechanically counteract the postural hypotension in the lower extremities following landing. Inflation of the pressure garment provides a pressure gradient of 85-90 torr at the ankles to 10 torr at the waist. This results in a subsequent reduction in heart rate and a blood pressure maintained at near supine levels.

The procedural algorithm for the three missions was checked in the Skylab medical equipment altitude chamber. The testing consisted of a 56 day mission simulation, on earth, in a controlled environment configured similarly to the OWS crew quarters level. The atmosphere of the chamber was maintained at actual operating flight conditions with a mixture of 70% oxygen and 30% nitrogen at 5 psia (pounds per square inch absolute). Carbon dioxide levels were controlled at a nominal level of 5 torr.

The sequence of events for the OWS insertion into orbit and the following Skylab missions numbered Skylab 1, 2, 3, and 4, respectively, are shown in Figure II. The typical mission profile is shown in Figure V. Some additions were later made in the inflight tests, Table I and some special pre and postflight tests were performed, Table II. It is important to note that postflight measurements were continued until preflight levels had been restored. This provided a continuous time history of data for the flight and paraflight time.

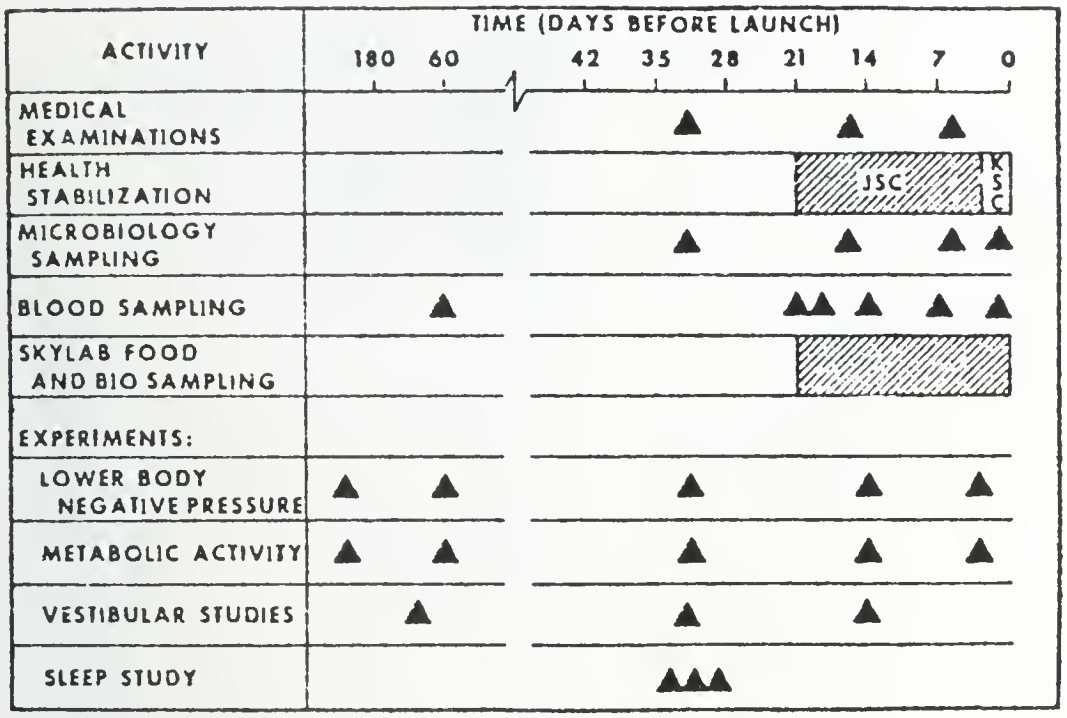


Figure V(a)

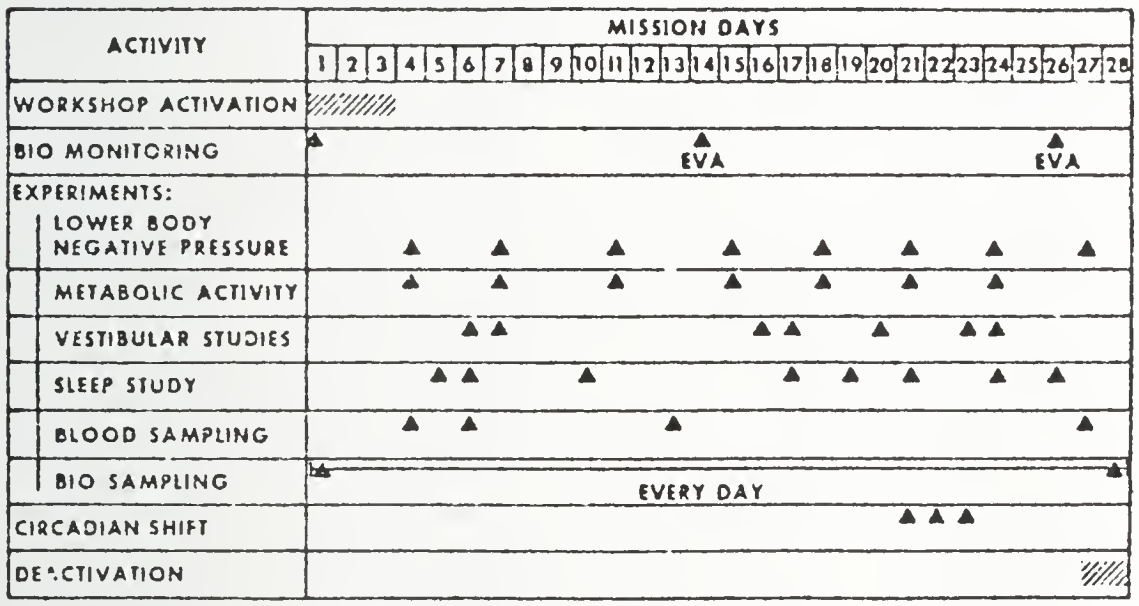


Figure V(b)

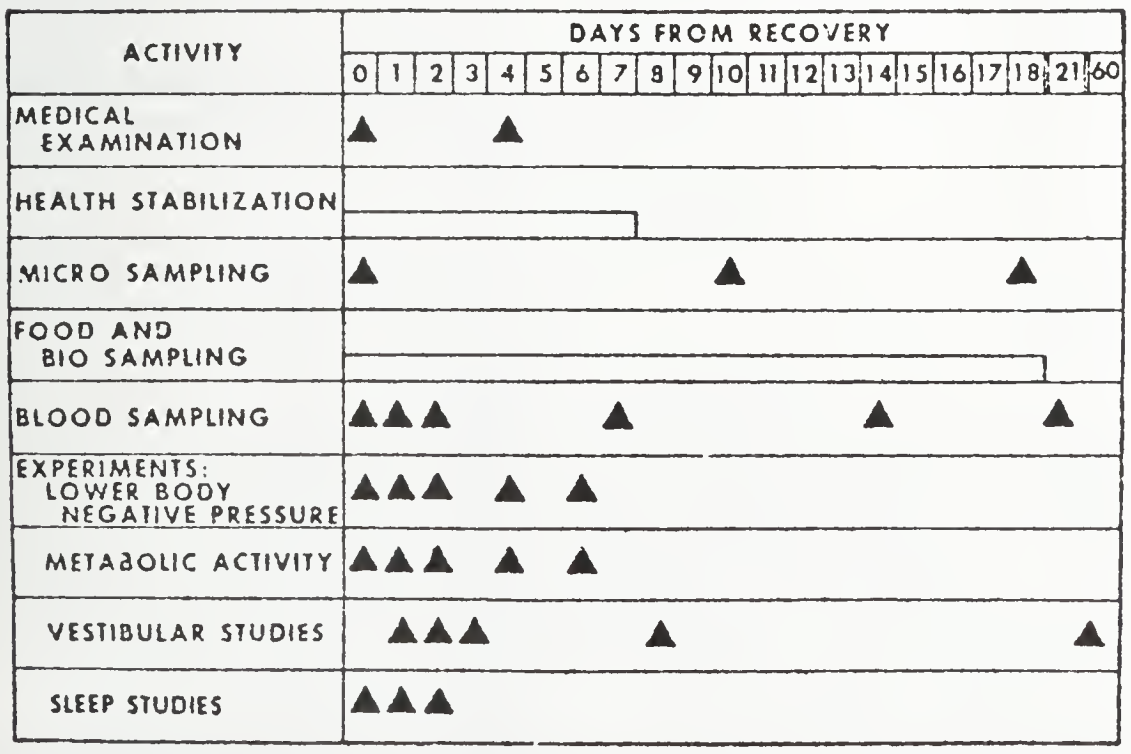

ACTIVITY
DAYS FROM RECOVERY
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 21 60
MEDICAL EXAMINATION
HEALTH STABILIZATION
MICRO SAMPLING
FOOD AND BIO SAMPLING
BLOOD SAMPLING
EXPERIMENTS: LOWER BODY NEGATIVE PRESSURE
METABOLIC ACTIVITY
VESTIBULAR STUDIES
SLEEP STUDIES

Figure V(c)

The Skylab medical program has added insight to the effects of space on man. The inflight portions of the missions totaled 168 days over a period of 8½ months. Skylab 4, alone, had an 84 day inflight time. More than 70,000 biochemical analyses were made with over 18,000 blood pressure readings along with 12,000 minutes of vectorcardiographic data. The medical equipment functioned perfectly and provided medical data of excellent quality.

Medical Complications of Life in Space

The absence of gravity seems to be the most important factor affecting the anatomical, physiological, and psychophysical mechanisms of the human machine. Essentially, these systems evolved due to gravity, function with its presence, and expect its existence. It seems reasonable that the removal of gravity would not be without certain consequences.

The zero-gravity responses elicited by spaceflight include: disorientation of body location, initial rapid 5-6% decrease in body weight (response) followed by a restoration to normal weight (compensation), demineralization of bone at the extremities, decrease in muscle size including leg and cardiac dimensions, nausea, and metabolic disruption. The effect of null gravity can be considered to have effects on performance, the vestibular system, the cardiovascular system, and the musculoskeletal system.

Performance

Perfomance effects manifest themselves during the execution of work related tasks during flight. Both Apollo and Skylab missions had many extra vehicular activities (EVA) to be performed. These included: retrieval of film and tape cassettes, repair of antennae, major repairs, and minor mechanical tasks. The amount of movement an object, subjected to an applied force, undergoes is inversely related to its inertia. This resulted in many instances of "an astronaut turning more than the wrench he was using" and causing premature physical exhaustion. The

Table 1

TEST	SKYLAB 3	SKYLAB 4
Blood Flow	x	x
Facial Photograph	x	x
Venous Compliance	x	x
Anthropometric Measurements	-	x
Treadmill Exerciser	-	x
Centre of Mass	-	x
Infrared Anatomical Photograph	-	x
Taste and Aroma Evaluation	-	x
Atmospheric Volatile Concentration	-	x
Light Flash Observations	-	x
Hemoglobin	x	x
Urine Specific Gravity	x	x
Urine Mass Measurement	x	-
Stereophotogrammetry	-	x

Table 2

TEST	SKYLAB 2	SKYLAB 3	SKYLAB 4
Echocardiography	-	-	x
Blood Circulation Time	-	-	x
Postural Equilibrium Test	-	x	x
Venous Compliance	-	x	x
Muscle Strenght	x	x	x

problem is easily solved with specialized tools and restraints. Ease of operating in space, with the concomitant reduction of fatigue, is also achieved by preflight conditioning. Zero-gravity can be simulated in large water-filled tanks and in an aircraft flying a parabolic trajectory. The Apollo lunar excursions were facilitated by the presence of 0.16 g but any EVA in orbit will have no gravity. The upcoming shuttle missions are designed to study the latter instance in more detail.

One other peculiarity of null gravity is that it causes the astronaut to assume what is called the "zero-gravity crouch." During weightlessness, "the human body assumes a half-sitting stance, with the feet drooping at the ankles, knees bent, shoulders slightly hunched forward, and head tilted down." An important consequence arising from this is the deflection of the line of sight downwards by 15°. The "zero-gravity crouch" has been taken into consideration by Spar Aerospace Ltd. in Toronto, who are building the remote manipulator system (RMS) for the American space shuttle. Astronauts have been commuting, for the past year, from the Johnson Space Flight Centre in Houston to Toronto for training on how to handle the 50 ft. long mechanical arm.

Vestibular Dysfunction

Vestibular dysfunctions arise as a consequence of withdrawal of gravity, rapid accelerations, and rotations. The vestibular system is sensitive to numerous stimuli arising from the environment. The system acts as a combination of linear and angular accelerometers which cannot be recalibrated for use in space. Malfunctions in the vestibular apparatus produce disorientation, nausea, nystagmus, and visual illusions. Rotation of fixed objects through 90° and inversion of instruments may occur. Experiments in Skylab have shown that the larger the spacecraft the greater the increase in the number and severity of vestibular dysfunction cases. There has also been reported a correlation between increased movement and increased nausea. Adaptation to zero-gravity (which takes 2-3 days) eventually decreases nausea and produces relief but the adaptation period depends on the individual. This particular area of neurophysiology, the vestibular adaptive process, needs more detailed investigation before preflight susceptibility tests can be performed on astronauts. Presently, anti-motion-sickness medication provides some protection to the crewmen.

Cardiovascular Effects

Cardiovascular effects include changes in the heart and the venous pumping mechanisms. While in space, the heart beats faster and its actual size decreases. Coupling this effect with the performance of strenuous activity results in overwork. The cardiac arrhythmias noted in Apollo and Skylab missions have been attributed to hypokalemia and overexertion. A simple solution seems to be reduced workloads and provisions of potassium supplements. Generalized comments that have been made are:

1) The dehydration which occurs in space decreases the venous return (decreasing preload and stroke volume) and to maintain cardiac output the heart rate increases (since $CO = HR \times SV$). The change is adaptive and stabilizes after 4 to 6 weeks.

2) Cardiac electrical activity has remained within the physiological limits, according to the vectorcardiographic data obtained from Skylab.

3) Postflight recovery of orthostatic and exercise tolerance is directly related to the amount of inflight exercise and postflight reconditioning exercises. Both effects are related to the effective diminished circulating blood volume upon re-entry into a 1-g environment. No convincing incidence of myocardial damage as an etiological factor exists, but transient cellular changes are possible.

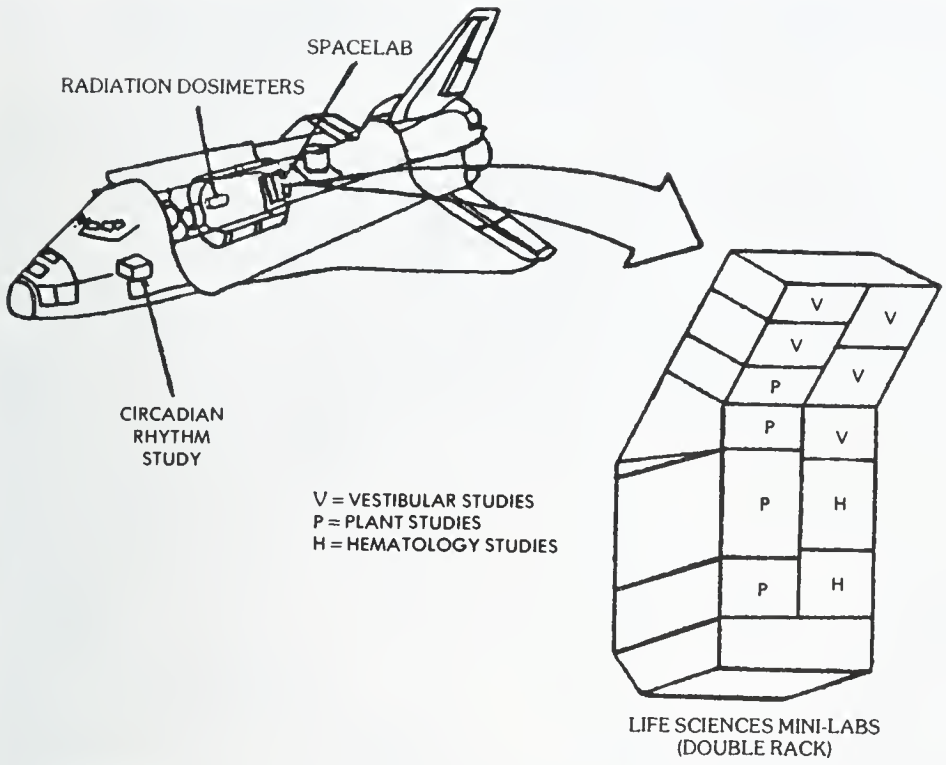


Figure VI: Life sciences Spacelab 1 with mini-lab.

If controlled properly, the effects of space on the cardiovascular system can be of little consequence.

Musculoskeletal, Gastrointestinal and Renal Effects

The musculoskeletal system of man, which evolved to provide support and reinforcement to the entire body, must be affected. Evolution in a 1-g environment guaranteed the development of muscles and bones at the extremities. In space, with no gravity, the controlling influences disappear and the musculoskeletal system begins to show regressive changes. The musculature begins to weaken and diminish in size. The major areas affected are the heart, legs, abdomen, and neck. The loss is most pronounced in the lower extremities. Bones demineralize due to lack of exercise and the absence of gravity. Calcium is depleted, resulting in brittle bones.

The musculoskeletal changes may be related to the generally subservient electrolyte imbalances that occur. Crew caloric intake in Skylab was established before flight to provide necessary weight control and to satisfy appetite. Some loss of appetite during the initial phase of the flight occured and this was probably related to the motion sickness effects. Water intake and urine output remained fairly constant during all mission phases. The generalized findings from the examined urine and fecal specimens include a moderate loss of calcium, phosphorous, and nitrogen. These losses have been compared to those observed in bed-rest patients of 8 to 9 months. The data indicate that missions of extended duration would be feasible without any further preventative or remedial measures (balanced diet and exercise).

Renal function during flight was unimpaired due to the complex interactions of humoral and hemodynamic factors. However, the correct combination of body support, muscular exercise, hormonal effects, and circulatory factors required to counteract these regressive processes have not been delineated to this date. Cortisol secretion, during the more stressful aspects of flight, complicates matters and must make some contribution to the mineral and nitrogen balance.

Conclusions

Many factors must be considered in the selection and training of astronaut scientists. One other important aspect is the psychological condition of the astronaut. The physiological and psychological systems are in balance and dependent on one another. Stress tolerance would be important, especially during emergency situations. The psychological response in conjunction with the physiological effects, can be evaluated by using sophisticated simulators which can replicate various emergency situations. The reaction of the pilot would be monitored and his efficacy at correcting the problem could be evaluated.

Many of the remaining questions may be answered by the first NASA/ESA Spacelab flight in 1980.

The European Space Agency (ESA) has been contracted to build Spacelab, Figure VI, a pressurized experimental laboratory with a shirt-sleeve environment. It has been designed, in part, to perform various experiments which would verify the Skylab results. Spacelab will sit in the cargo hold of the space shuttle and be used to conduct 17 NASA-sponsored research projects. Seven of these investigations concern the life sciences. Two vestibular studies will be conducted as well as two other experiments concerned with the spaceflight effects on the hematologic system. Effects on plant organs, the effect of the Spacelab environment on circadian rhythms, and the mapping of radiation levels in the Spacelab environment comprise the remaining life sciences experiments.

Spacelabs on future shuttle flights will provide opportunities for more comprehensive life science research. This type of research will allow the advancement of man into space, to utilize the raw materials of space, to establish new energy sources, and to colonize not only the moon but beyond. □

References

Extensive references are available on request.

Heredofamilial Intestinal Polyposis- A Case Report

Michael T. Stechison 8T1

This paper consists of a case report of Gardner's syndrome, followed by a discussion of the major syndromes of heredofamilial intestinal polyposis- Gardner's syndrome, familial multiple polyposis of the colon, Turcot-Despres, and Peutz-Jeghers syndrome. Juvenile intestinal polyposis is not considered in any detail.

Case Report

A 54 year old man was admitted to Wellesley Hospital complaining of dull epigastric pain, progressive fatigue, and a weight loss of 40 lb. over a 6 month period.

Two years previously the patient was diagnosed as having Gardner's syndrome after it was discovered in his 21 year old daughter. Her dentist had detected bone lesions of the mandible and maxilla, and had referred her to the Toronto Western Hospital for investigation of the gastrointestinal tract. Sigmoidoscopy and barium enema revealed multiple polyposis of the colon. Following this the rest of the family was similarly investigated, and the father, who was asymptomatic at the time, was found to have multiple polyposis of the colon, as well as a maxillary bone cyst, and an epidermoid cyst above his eyebrow. He then underwent a total colectomy, and an ileorectal anastomosis was performed. The operative specimen showed no evidence of malignancy. His daughter also had the same procedure performed at that time.

Since the operation he has experienced a persistent dull epigastric ache. There have been no changes in bowel habits with approximately 5 movements of semi-formed stools per day. Occasional episodes of perianal burning following defecation are experienced, as well as occassional fecal incontinence.

Despite no change in diet or appetite, there has been a 40 lb. weight loss over a 6 month period. The patient has not complained of any dysphagia, or early satiety. There has been no vomiting, melena, hematochezia, abdominal tenderness, or jaundice.

The progressive fatigue experienced over the last half year has begun to interfere with his work as an electrician. In addition to this a fine tremor of the upper extremities has developed which has proved a further encumbrance to his work.

The patient's past health has been unremarkable. There is a history of carcinoma of the pancreas in his father, Gardner's syndrome in one daughter, while 3 sons, and another daughter remain in good health.

Physical examination revealed a thin, 53 year old man in no distress, appearing his stated age, and showing no evidence of pallor, cyanosis, or jaundice. Heart rate was 75 bpm and regular, BP 140/80/75 mmHg in both arms, in the recumbent position. Bilateral lid lag, and stare were observed. An epidermoid cyst was present above the right eyebrow. The thyroid was not enlarged, and there was no lymphadenopathy. All peripheral pulses were palpable. Heart sounds were normal, a soft S_4 was audible, as well as a Gr. II/VI sysolic ejection murmur along the left sternal border. The chest was clear. Abdominal examination revealed a well-healed 15 cm left paramedian incision. The scar became wider at its inferior aspect with a maximum width of 4 cm. There was no visible distention. Bowel sounds were normal. There was no tenderness, guarding, or rebound, and no organomegaly, or masses. On rectal exam, there was minimal sphincter tone, no tenderness or masses palpable, and no formed stool present. Sigmoidoscopy disclosed much mucoid stool, as well as several polyps in the lower rectal ampulla and normal ilium proximal to the anastomosis at 14 cm. Musculoskeletal and nervous systems were grossly normal. A fine tremor of the upper extremities was observed.

On admission the hemoglobin was 13.8 g/dl, and WBC 6,700/mm^3. Serum electrolytes were within normal range. Alkaline phosphatase was 100 IU (normal 25-90), and SGOT was normal. Total bilirubin was 2.6 mg/gl, with a direct fraction of 0.3 mg/dl. This abnormality had been previously noted, and Gilbert's syndrome was suspected, although not confirmed. Chest X-ray, and ECG were unremarkable. Air contrast upper GI studies (see Figs 1,2) revealed carpeting of the gastric mucosa with polyps, which on gastroscopy appeared to be sessile. Abdominal CT scans were normal, showing no evidence of desmoid tumours.

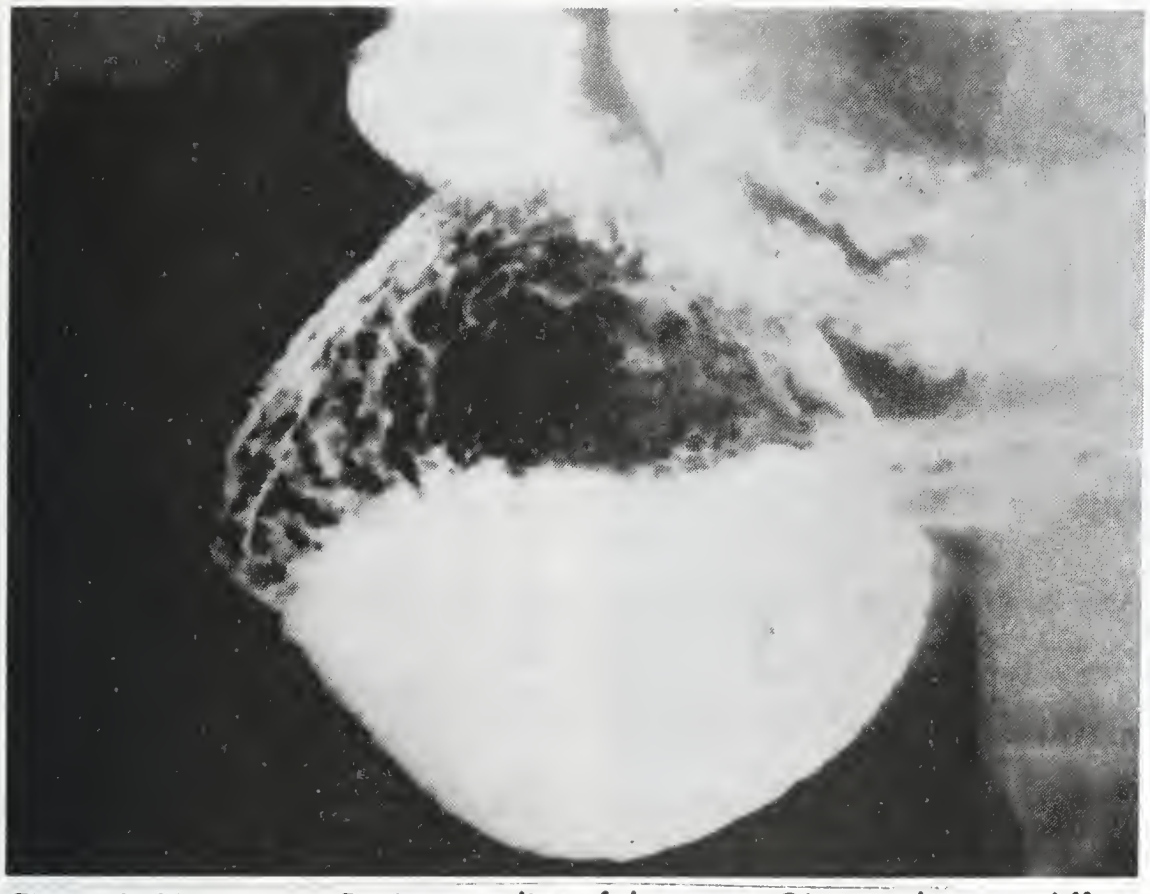


Figure I: Air contrast Barium studies of the upper GI tract showing diffuse polyps throughout the stomach.

Thyroid indices were measured, yielding a T_4 of 17 ug/dl (normal 4-11 ug/dl), T_3 resin uptake of 41% (normal 25-35%), and T_3 of 330 ng/dl (normal 100-220 ng/dl). An Endocrinology consultation was obtained, and a diagnosis of Grave's disease was made. Thyroid scan showed diffuse enlargement, and radioactive iodine uptake was 57% (normal 10-35%). The patient was started on propylthoiuracil 100 mg qid under the care of an endocrinologist, and arrangements were made for treatment with ^{131}I. He was also instructed to return for annual sigmoidoscopic examination.

Discussion

Gastrointestinal polyps may occur sporadically as pedunculated adenomata occurring in approximately 10% of the general population, as sessile villous adenomata which affect less than 2% of the population, or much more rarely, as a familial pattern of multiple polyposis possibly with extraintestinal manifestations. A familial pattern of polyposis coli was first described by Cripps in the late 19th century. Since then, the specific syndromes described in the literature include familial multiple polyposis, Gardner's syndrome, Turcot-Despres, Peutz-Jeghers, and several syndromes of juvenile polyposis.

Gardner's Syndrome

Gardner's syndrome was first described in 1953 by Gardner and Richards, and since then some 230 cases have been observed. The condition was originally defined by the triad of multiple adenomatous polyps of the large intestine, multiple osteomata of the head, and multiple cysts and soft fibromas of the skin. Since then the syndrome has expanded to include numerous dental abnormalities (impacted teeth, supernumerary teeth, dental cysts), osteomata involving any bone, desmoid tumours resulting from excessive fibroblastic activity either in laparotomy scars, or within the peritoneal cavity or retroperitoneum, and extracolonic malignancies, most commonly invilving the periampullary region of the duodenum, as well as thyroid, and adrenal glands. There are, however, no strict criteria governing exactly which of, and how many of, the above are requisite for the diagnosis to be made. Although originally the polyps were confined to the colon, the increased use of endoscopy has disclosed their presence in the small bowel, as well as the stomach. The gastric oplyps are often found to be hamartomatous, while the duodenal lesions are usually adenomata as are found in the colon.

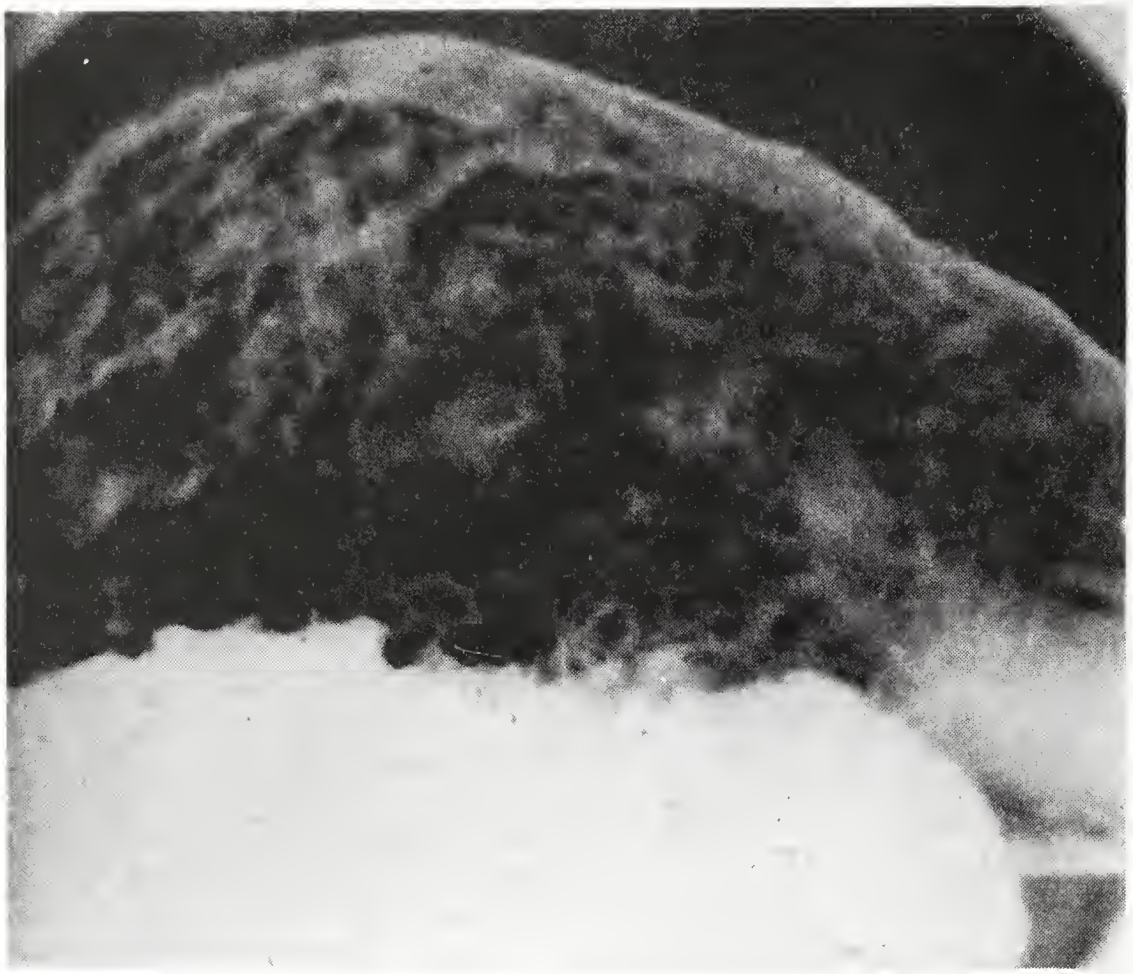
The mode of inheritance is autosomal dominant. Pleiotropy has been surmised as a possible explanation for the concurrence of adenomatous, as well as hamartomatous lesions. The polyps are not present congenitally, and may not appear until adolescence, or as late as the 4th or 5th decade. There is an inevitable progression to malignancy in all cases usually those involving the colon, but at least 30 examples of duodenal adenocarcinoma have been documented.

Most cases are asymptomatic and are diagnosed incidentally, as in the above case. Possible symptomatology includes hematochezia, anemia, diarrhea, constipation, and lower abdominal colic either due to distortion of the mesentery by desmoid tumours, or bowel obstruction secondary to fibrous bands. Urinary tract obstruction due to retroperitoneal fibrosis with ureteral compression is possible. In addition there may be nonspecific constitutional complaints such as fatigue, and weight loss.

The osteomata rarely undergo malignant transformation. Often in the long bones there may be a radiologic appearance of osteosclerosis. The bony and soft tissue lesions may be extensive and often precede the onset of symptoms referable to the polyposis, thereby affording an early diagnostic clue allowing the malignant progression to be interrupted.

All patients with a positive family history of this disorder should have a thorough physical examination, with careful search for soft tissue tumours. Rectal examination, and sigmoidoscopy should be performed, as well as testing stools for occult blood. If any soft tissue abnormalities are found, annual follow-up examination is indicated. If multiple polyposis is demonstrated, total colectomy should be performed at that time. Some surgeons advocate total procto-colectomy with ileostomy, thereby removing the rectum with its propensity for fostering malignant change in recurrent polyps. Others perform colectomy with ileorectal anastomosis, affording the patient the convenience of defecation by the traditional route. In

Figure II: Close-up view of the polyps in the stomach.



this latter situation it is essential for the patient to commit himself to sigmoidoscopic follow-up examination annually, or bi-annually, with prompt removal of any new polyps which may develop.

Familial Multiple Polyposis

Familial multiple polyposis (which from herein shall be referred to as FMP) is the most common of the familial syndromes, with an incidence of 1/8300 live births, and it is the one most similar to Gardner's syndrome (see Table I for comparison of the two disorders). This condition and its propensity for malignant degeneration has been known for nearly a century. It is characterized by multiple adenomatous polyps, as well as occassional villous, and mixed adenomata. These involve only the colon, and vary in number from 150 to several thousand. These polyps appear usually by the 2nd to 3rd decade, rarely any later. As with Gardner's syndrome, malignant degeneration is inevitable if the natural history is not interrupted. The average age of onset of carcinoma of

Table 1

	Familial Multiple Polyposis	Gardner's Syndrome
Incidence	1/8300 live births	230 known cases
Inheritance	autosomal dominant	autosomal dominant
Onset of polyps	2nd-3rd decades	3rd-5th decade, commonly in 5th
Location	colon	colon, small intestine, stomach
No. of polyps	100's-1000's	100's-1000's
Natural history	malignant transformation in all cases	malignant transformation in all cases
Average age of onset of carcinoma of the colon	39 years	somewhat later
Extracolonic manifestations	none	osteomas, epidermoid cysts, dental abnormalities, desmoid tumours, extracolonic malignancies
Cultured fibroblasts	normal	frequent tetraploidy

the colon in this condition is 39 years, as opposed to 67 years in the general population. Patients with this disorder often already have a carcinoma at the time of presentation.

The inheritance of this disorder also appears to be autosomal dominant. Those cases without a family history, and where illegitimacy has been ruled out, likely arose from spontaneous mutation. This group is similar in every manner to the familial type except that carcinoma tends to appear even earlier.

The possible clinical picture includes insidious onset of diarrhea, hematochezia, crampy abdominal pain, anemia, electrolyte imbalance, and weight loss. Carcinoma appears on average 8 years after development of the polyps. Unlike Gardner's syndrome, there are no extraintestinal manifestations to suggest the condition sufficiently early to allow intervention, and thus prevention of the malignant progression.

While FMP, and Gardner's syndrome appear readily distinguishable, there has been some suggestion that if one is diligent enough in the search, then it is possible to find some extracolonic manifestations in FMP as well. It has therefore been claimed that FMP, and Gardner's syndrome are essentially the same entity. This would imply that rather than dealing with 2 allelic autosomal dominant genes, both disorders may be due to one dominant gene with variable expressivity, thereby making a florid picture of Gardner's syndrome and a case of FMP extremes of the spectrum of one disease entity. While Gardner's syndrome may not hold exclusive rights to extra-intestinal lesions in all cases, it is clearly distinguished by the increased incidence of tetraploidy in skin fibroblasts cultured in vitro, which has not been demonstrated in cells from FMP patients. Nevertheless, the genetic difference or similarity between the 2 disorders remains in the realm of speculation.

Turcot-Depres Syndrome

Turcot, Depres, and St. Pierre have described a brother and sister, both with multiple adenomatous polyposis of the colon. The brother, in addition, had a medulloblastoma of the spinal cord, as well as an adenocarcinoma of the colon. The

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sister developed a glioblastoma of the frontal lobe, but was treated with a total colectomy before a colonic neoplasm could develop. A similar case associated with an ependymoma has been reported. This rare disorder is thought to have an autosomal recessive mode of inheritance, and is known as the Turcot-Despres syndrome.

Peutz-Jeghers Syndrome

A disorder consisting of small intestinal polyps, in conjunction with mucocutaneous pigmentation was first described in 1921 by Peutz. The polyps in this syndrome are hamartomatous, and involve predominantly the small intestine, but may also occur in the stomach and colon. Polyps have also been described in nasal, bronchial, and vesical locations. Pigmentation most commonly involves the buccal mucosa and perianal skin, and may be noted in affected infants. Melanin deposits are also found on the anal and rectal mucosa, the skin of the lips, palms, finger tips, dorsum of the hands, and soles of the feet. The skin pigmentation fades as puberty is approached, while the mucosal pigmentation remains.

This disorder has an autosomal dominant pleiotropic inheritance. Patients do not present until approximately age 20. Although the polyps are present congenitally, they may grow in size and may be associated with intussusception, and bowel obstruction. There may be symptoms of recurrent abdominal pain, hematochezia, hematemesis, and anemia. In spite of the benign nature of the polyps, there is a 2-3% incidence of adenocarcinoma, most commonly involving the duodenum. In addition, ovarian cysts, and tumours have been reported.

Extensive surgical intervention is not indicated except for obstruction, intussusception, or bleeding, in which case as little bowel as possible should be resected.

Conclusion

In addition to the above-mentioned syndromes, there are several rare heritable juvenile hamartomatous polyposis syndromes. These are almost never associated with intestinal malignancy, and will not be discussed here.

The essential features of the heredofamilial polyposis syndromes have been discussed. It is important to be aware of these conditions because of the high risk of malignant change. An awareness of extraintestinal stigmata of Gardner's and the Turcot-Despres syndromes, and knowledge of the inheritance patterns of all of these conditions will permit the prevention of unnecessary cancer-related deaths through prophylactic colectomy. Alternatively, one should be aware of the extremely weak association of the Peutz-Jeghers syndrome with intestinal malignancy so that unnecessarily aggressive management may be avoided. □

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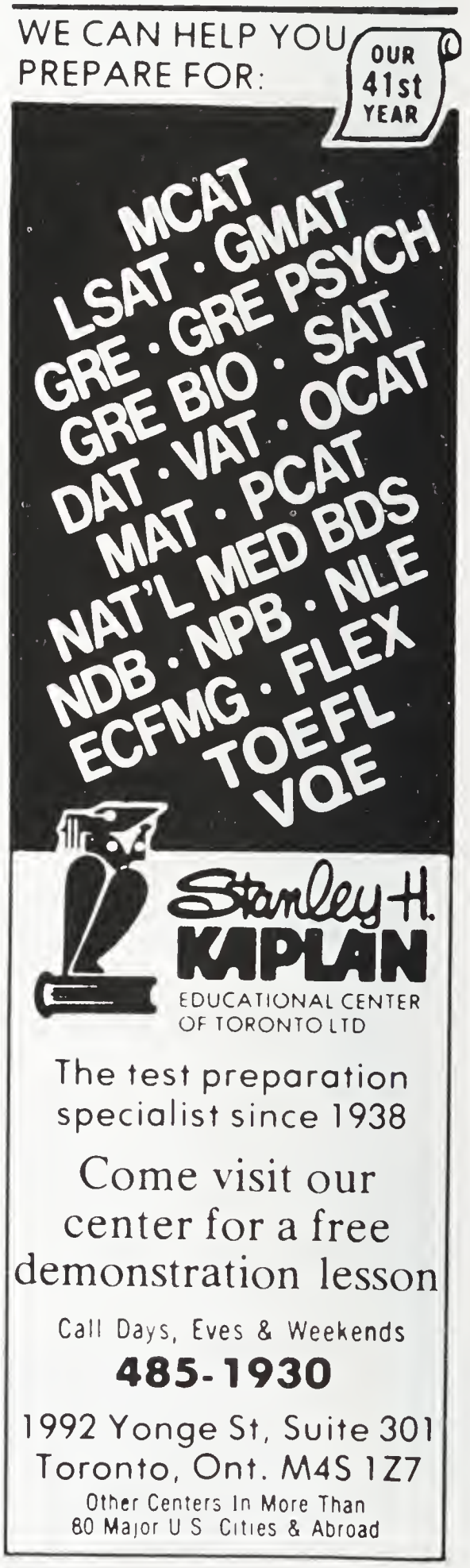
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Microsurgery: Through the Looking Glass

Imagine suture material so fine that it is half the diameter of a human hair, or less. Imagine manipulating surgical instruments so minute that the limiting factor is not hand-coordination itself, but the ability of the eye to direct the hand. Imagine operating on a field so miniscule that it must be magnified several times under a powerful microscope, interposed between you and the tissues you're handling. If you can imagine all that you are imagining the fascinating world of microsurgery, a discipline that, over the last few decades, has revolutionized many aspects of conventional surgery.

Microsurgery, as its name implies, is surgery performed under the microscope. It found its initial proponents in the area of otolaryngology where operations within the narrow confines of the middle ear necessitated instruments much smaller than had previously been employed and, subsequently, a way to visualize them. Ophthamologists, forced to work in the miniature world of the eye, adopted it next to be followed over the last two decades by vascular, neurological and plastic surgeons and, most recently, gynecologists, urologists and orthopedic surgeons. In all these fields conventional surgical techniques were first refined, with resulting higher success rates, followed by application to the repair of structures and the restoration of function considered irreparable before.

Today people undergoing resection of acoustic neuromas no longer face a 50% chance of resulting facial nerve paralysis. Ophthamologists are capable of restoring vision via vitrectomies or corneal transplants, while the hearing of millions has been improved thanks to the ability to excise sclerosed stapes and replace them with a prothesis. One of the most all-encompassing and active fields is that of reconstructive micro-surgery. This is concerned with the restoration of structure and function of severed body parts, utilizing the careful reanastamosis of vital vessels and nerves. Over the last decade the success rate for the replantation of amputated digits has reached 89% and, along with digits, whole hands, arms and legs have been reattached. Results with the replantation of larger parts are further complicated by the presence of mixed motor and sensory nerves and extensive muscle death. But the search for more efficient techniques goes on.

On Friday, April 11th, 1980 Dr. Rolin K. Daniel, Chief of Plastic Surgery and Director of the Microsurgical Teaching Laboratories at the Royal Victoria Hospital in Montreal, will be coming to the University of Toronto to speak on the topic of microsurgery. Born and raised in Montgomery, Alabama, Dr. Daniel, now 36, graduated with a surgical internship in St. Louis, he moved to Montreal in 1970 as an Assistant Surgical Resident where he became involved in plastic surgery and microsurgery at the Montreal General Hospital. He earned an M.Sc. in 1974 and in 1976 became Assistant Professor at the M.D. Anderson Hospital and Tumor Institute in Houston. He was made Assistant Professor of Surgery at McGill University in Montreal in 1976, rising to Associate Professor in 1979.

Travelling scholarships have taken him all over the world, including microsurgical centres in Europe and Japan, and in 1973 he was a member of the American Replantation Mission to the People's Republic of China.

He has published numerous articles on the topic of microsurgery and has been involved in the production of movies on the subjects of neurovascular free flaps and vascularized bone grafts. As a visiting lecturer on many occasions over the last four years he has spoken at Universities and Symposia across North America, as well as in Europe and South America.

It is with great honour that we add the University of Toronto to this growing list as Dr. Daniel presents the 1980 Medical Society Lecture, entitled

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Yesterday someone thought to look under a microscope to improve their view on the middle ear. Tomorrow maybe someone will come up with a way of performing cerebral revascularizations to by-pass thrombosed cerebral vessels. Who knows: the answer is "through the looking glass". □

(continued from page 75)

can at least reasonably assume that the likelihood of torture increases with the number of positive findings. An analogy has been drawn to the Child Abuse Syndrome. It is hoped that the "torture syndrome," once clearly defined, will also be accepted by the medical community as a legitimate diagnosis. Furthermore, physicians are presently legally required to report a suspected case of child abuse; it is less likely, though, that similar legislation would be enacted for the previously tortured refugee.

Sometimes it is difficult to even demonstrate the sequelae, let alone conclude that they constitute a "torture syndrome". Even as doctors are now attempting to ascertain the effects, torturers are using more subtle techniques that leave fewer traces. Some recently tortured refugees have reported being struck with truncheons wrapped in wet cloths, which minimize visible damage (without reducing the pain); use of electrical torture and psychological methods also yield less obvious sequelae. Another problem is that psychiatric manifestations, such as a demonstrable neurosis, may not seem convincing as evidence of torture, specifically. "What really is important," observes Canadian Medical Group member Dr. Maria Waiver, "are the psychological effects, often indelible, which persist long after the physical lesions have healed." Yet immigration officials, in scrutinizing refugee applicants, tend to accept with reluctance, psychiatric (as compared to physical) evidence. As a result, some physicians have urged that the authorities adopt a "reversion of the burden of proof" attitude toward alleged torture victims; that is, admission of causality from torture unless proven otherwise by medical opinion. An analogous policy has been satisfactorily pursued by some European governments in determining compensation for World War II concentration camp survivors.

Research Against Torture

Two facets of scientific research are currently being pursued by the adjunct Anti-Torture Research organization of Amnesty International. The first is a description of the epidemiology of torture as a widespread (and contagious) disease. In Canada, questionnaires are being circulated to physicians who have examined victims, in order to collect and analyze the medical data gathered. An insight into the "etiology" of torture—i.e., what factors predispose to its systematic use in certain countries — may be a step toward the ultimate goal of control of this "epidemic."

The second aspect is biomedical understanding of the sequelae, which would aid in defining the specific criteria of the "torture syndrome," and improve the basis for treatment of victims. Some Danish physicians are, for example, currently conducting pathophysiological studies of *falanga*, the victims of which often experience walking difficulties as a result of ischaemic lesions of the feet. Other Danish investigators are searching for persistent, diagnostic histologic changes induced by the application of electricity to the skin; ironically, such experiments on anesthetized pigs have provoked criticism from animal protection groups. Projects now being pursued by Canadian Medical Group members include: myocardial infarction and cerebral asthenopia as torture sequelae, myopia as a sequela to prolonged confinement in a small room, psychiatric disorders as sequelae to solitary confinement, and impaired neural transmission as a sequela to electrical torture or to suspension by the extremities.

Medical Ethics & Persecuted Colleagues

The establishment of universal codes of ethics, with rules for professional conduct, function as a major weapon to counter the perversion of medical skills in the service of torture. A physician who may consider participating, because of allegiance to the national interest, may look to such standards to guide his behaviour. Moreover, mechanisms for the enforcement of these rules permit the medical community to investigate and censure the transgressors. Dr. Alfred Gellhorn, President of the CIOMS, has spoken of an "international mobilization of medical ethics as a deterrent to torture."

The problem of torture has been non-specifically included in earlier declarations of medical ethics. The Declaration of Geneva, proclaimed by the World Medical Association in 1946, stated in part that: "...Even under threat I will not use my medical knowledge contrary to the laws of humanity." Three years later, the W.M.A. formulated the International Code of Medical Ethics, which asserted that:

> Under no circumstances is a doctor permitted to do anything that could weaken the physical or mental resistance of a human being, except for strictly therapeutic or prophylactic indications imposed in the interest of the patient.

Acting on proposals suggested by Amnesty's Medical Commission of the Conference for the Abolition of Torture, the W.M.A. adopted, in 1975, the Declaration of Tokyo, which provided "Guidelines for Medical Doctors Concerning Torture and other Cruel, Inhuman or Degrading Treatment or Punishment." A major injunction against the abuse of psychiatry for political purposes was also delivered by the World Psychiatric Association in its 1977 Declaration of Honolulu.

Seeking to uphold these principles, physicians in Amnesty International have conducted publicity campaigns and mass letter-writing appeals to governments and medical authorities in countries where violations reportedly exist. One current example of concern has been the "cruel and unusual" corporal punishments imposed as judicial sentences under the Islamic Shari'a in Pakistan. There, doctors have certified condemned prisoners "fit" for flogging, and are compelled to perform surgical amputations of hands and feet. (So far, no amputations have been done, though prisoners have been thus sentenced.)

Appeals and interventions on behalf of persecuted medical personnel have also been made. At Amnesty's 1978 Medical Seminar, concern was expressed for the fate of seven Soviet psychiatrists who had protested the abuse of political in-

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mates; one of the seven, Dr. Anatoly Barabanov, himself had been declared "mentally ill" and committed to a psychiatric hospital. An appeal was also launched for Dr. Alberto Falicoff of Argentina. The 1979 Medical Mission to Latin America and the recent Conference on Torture and Disappearances have produced interventions on behalf of "disappeared" Colombian physicians, as well as support for medical personnel in Costa Rica, Mexico and Venezuela, involved in anti-torture work.

We have thus seen that the issue of torture, while of humanitarian concern to people from all walks of life, poses a special challenge to the world's medical community. Professional duty to the well-being of individuals obliges physicians to be concerned with the prevalence of torture. Medical knowledge and skills enable physicians to combat the practice of torture. In the words of Drs. Sagan and Jonsen, in their essay, "Medical Ethics and Torture," *"Even when medical skills and personnel have no direct involvement, physical and psychologic abuse of human beings should arouse the utmost disgust and anger in anyone dedicated to healing."*

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(continued from page 80)

even if it works — would be an insult to my human dignity. And who knows, if the ability to express my problems by physical symptoms were taken away from me, I may find other ways to express them. Maybe chronic depression. I would much rather get to the root of these problems and tackle them specifically, and if they could not be tackled specifically then I would prefer to face the consequences of the truth.

I believe that the little old lady who pesters doctor after doctor with her apparently nonphysiological problems deserves the same kind of treatment that I deserve — not to be convinced with a sugar pill. As her physician, if that includes the unpleasant duty of telling this little old lady what she does not want to hear — that her problems are predominantly a result of psychological process; and taking a minute to listen to her problems and suggesting whatever I think may help; then I feel that I will have done more for her than if I will have taken away her symptoms. If I could not deal with her symptoms specifically then I would admit defeat; even if the symptoms were to persist, I would have been honest with myself and with the patient, and I would have shown respect for the patient's human dignity.

I cannot assume that every patient values honesty and what I call human dignity to the same extent that I do. But on the other hand, neither can a physician assume that the patient does not value these qualities, even if the physician can be sure of the medical effectiveness of the placebo.

N.K. Koifman, 8T1

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